DOE/EA-1420 (Draft)

ENVIRONMENTAL ASSESSMENT

CONSOL ENERGY, INC. – RESEARCH & DEVELOPMENT

ENHANCED COALBED METHANE PRODUCTION AND SEQUESTRATION OF CO_2 IN UNMINEABLE COAL SEAMS

MARSHALL COUNTY, WEST VIRGINIA

DECEMBER 2002

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

National Environmental Policy Act (NEPA) Compliance
Cover Sheet

Title: Enhanced Coalbed Methane Production and Sequestration of CO_2 in Unmineable Coal Seams

Proposed Action:

The U.S. Department of Energy (DOE) proposes to provide cost-shared financial support, through a cooperative agreement with CONSOL Energy, Inc., for a proposed project to evaluate the effectiveness and economics of methane production and carbon dioxide (CO_2) sequestration in unmineable coal seams. The cooperative agreement would result in a 3-year project on land in Marshall County, WV.

Under the proposed project, CONSOL would conduct directional drilling of access wells into 2 coal seams from each of 3 surface locations; from each access well, directional drilling would be used to provide 4 horizontal holes into the coal seams beneath about 207 acres of land. Infrastructure would be installed (a) to inject CO_2 from the central well into the lower coal seam and (b) to both recover marketable methane from coalbed gas and monitor CO_2 leakage from the other 2 wells. A key objective of the project would be to test the potential for sequestration of CO_2 in a coal seam.

Type of Statement: Draft Environmental Assessment (EA)

Responsible Agency: U.S. Department of Energy; National Energy Technology Laboratory (NETL)

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Abstract:

DOE's objective in participating in the cooperative agreement is to support research and development for testing and verifying the ability to sequester CO_2 in unmineable coal seams and demonstrating the potential for injected CO_2 to enhance the recovery of coalbed methane. The environmental analysis identified that the most notable changes to result from the proposed action would occur in the following areas: land use, air resources, wastewater, and safety and health.

Public Participation:

DOE encourages public participation in the NEPA process. The public is invited to provide oral, written, or e-mail comments on this draft Environmental Assessment to the DOE contacts noted above by the close of the public comment period on January 24, 2003. Copies of the draft EA are also being distributed to cognizant Federal and state agencies. Comments received from public participation will be considered in preparing a final EA of the potential consequences of the proposed DOE action.

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LIST OF ABBREVIATIONS AND ACRONYMS

amsl	above mean sea level
bpd (BPD)	barrels per day
CAA	Clean Air Act
CBM	coal bed methane
CFD	cubic feet per day
CFR	Code of Federal Regulations
CH_4	methane
CNX Gas	CNX Gas Company, LLC
CO	carbon monoxide
CO_2	carbon dioxide
CSR	Code of State Regulations of the State of West Virginia
DAQ	West Virginia Division of Air Quality
dB	decibel
DOE	U.S. Department of Energy
DWR	West Virginia Division of Water Resources
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESCP	Erosion and Sediment Control Plan
FONSI	Finding of No Significant Impact
ft	foot (feet)
ft^2	square feet
H_2S	hydrogen sulfide
M	meter(s)
m^2	square meter(s)
MM	million
MSHA	Mine Safety and Health Administration
NAAQS	National Ambient Air Quality Standards
NPDES	National Pollution Discharge Elimination System
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSR	New Source Review
O_3	ozone
OOG	West Virginia Office of Oil and Gas
OSHA	Occupational Safety and Health Administration
Pb	lead

PDF	Permit Determination Form
pH	measurement of the acidity or alkalinity of a solution
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 microns
ppb	parts per billion
psi	pound per square inch
R&D	Research and Development
SO_2	sulfur dioxide
TMDL	Total Maximum Daily Load
tpy	tons per year
UIC	Underground Injection Control
WVDCH	West Virginia Division of Culture and History
WVDEP	West Virginia Department of Environmental Protection
WVDNR	West Virginia Division of Natural Resources
WVDOH	West Virginia Division of Highways
WVDWR	West Virginia Division of Water Resources

1.0 INTRODUCTION

This Environmental Assessment (EA) provides results of an analysis of the potential environmental impacts from a proposed project for *Enhanced Coalbed Methane Production and Sequestration of Carbon Dioxide in Unmineable Coal Seams*, hereafter referred to as the proposed project, in Marshall County, Wet Virginia. The U.S. Department of Energy (DOE) is proposing (the proposed action) to provide funding for the proposed project through a cooperative agreement with CONSOL Energy (DE-FC26-01NT41148). Under the agreement, CONSOL Energy's (CONSOL's) Research and Development (R&D) Department in South Park, Pennsylvania, would be responsible for the installation, operation, maintenance, and monitoring of the facilities needed for the completing the proposed project.

The purpose of the proposed project is to demonstrate the feasibility of sequestering carbon dioxide (CO_2), a greenhouse gas, in an unmineable coal seam while simultaneously enhancing the recovery of coalbed methane (CBM).

The purpose of this EA is to determine if the proposed project could potentially cause significant impacts to the environment. If potentially significant impacts are identified, and if they cannot be mitigated or avoided, then a more detailed Environmental Impact Statement (EIS) would be prepared. If no significant impacts are identified, a Finding of No Significant Impact (FONSI) would be prepared and made available to the public, along with the EA, before initiating the proposed action.

This study was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code 4321 *et seq.*), the Council on Environmental Quality Regulations (Title 40, Code of Federal Regulations (CFR), Parts 1500-1508), and the DOE's NEPA Implementing Procedures (Title 10, CFR, Part 1021).

2.0 PURPOSE AND NEED FOR AGENCY ACTION

The availability of clean, affordable energy is essential for the prosperity and security of the United States. Emissions of CO_2 into the atmosphere are an inherent part of energy-related activities, such as electricity generation, transportation, and building systems, which are responsible for about 85 percent of U.S. greenhouse gas emissions. Ninety-five percent of greenhouse gas emissions are dominated by CO_2 [(1)]. Over the last several decades, an increased concentration of CO_2 in the atmosphere of the earth has been observed, and some scientists believe that increased CO_2 concentrations may lead to changes in the earth's climate. Carbon sequestration offers an approach to redirect CO_2 emissions into sinks (e.g., geologic formations, soils, and vegetation) and potentially stabilize future atmospheric CO_2 levels. Carbon sequestration research is needed to evaluate and identify cost-effective strategies for controlling CO_2 concentrations in the atmosphere.

The scope of current research on CO_2 sequestration in unmineable coal seams includes mechanistic studies, field tests, and verification of the storage capacity of CO_2 in these seams. Some coal seams contain large amounts of methane-rich gas. CBM recovery represents a commercial practice that is typically accomplished by dewatering the coal seam, which allows the gas to drain from the coal [(2)]. A potential secondary recovery technique is to inject CO_2 gas into the coal seam to enhance the recovery of CBM [(3, 4, 5)]. Tests have shown that roughly two moles of CO_2 are absorbed per mole of CBM recovered [(6, 7, 8)], which provides the potential to efficiently displace CBM and effectively sequester CO_2 in the coal seams. The recovery of marketable CBM provides a value-added product that reduces the cost of sequestering CO_2 gas. One promising aspect of CO_2 sequestration in coal seams is that many of the large unmineable coal seams are near electricity-generation facilities that are large point sources of CO_2 gas. Thus, only limited pipeline transport of CO_2 gas would be needed, resulting in a lower overall cost to sequester CO_2 [(9)].

Fundamental investigations into defining the characteristics of coals that enhance CO_2 adsorption and storage in coal seams are being implemented by different entities in the U.S.[(10, 11, 12, 13)] and abroad [(14, 15, 16)]. Additional research and information development are needed to better estimate the potential capacity for cost-effective CO_2 sequestration in coal seams in the U.S., although the capacity is potentially huge [(17, 18)]. The U.S. coal resources are estimated at six trillion tons, with 90 percent unmineable due to seam thickness, depth, and structural integrity [(19)].

Field-testing activities proposed under the cooperative agreement with CONSOL would include monitoring and verification of CO_2 sequestered in unmineable coal seams following recovery of CBM and development of methodologies to assess and predict the long-term effect of sequestering CO_2 in coal seams.

This field testing would be consistent with DOE's missions and research objectives to ensure energy availability and to develop environmentally safe and economically affordable means to permanently sequester CO_2 in unmineable coal seams [(20, 21, 22)].

2.1 INTERNAL SCOPING

Internal scoping activities were conducted to identify significant issues associated with the proposed project. This effort was based on reviewing the proposed technology, the environmental setting, construction requirements, and background information from previous CBM recovery projects undertaken by CONSOL.

2.2 SCOPE OF ENVIRONMENTAL ASSESSMENT

The scope of the EA was established by considering both the potential environmental consequences of the proposed project and the Federal, state, and local permits required to develop the proposed project site. Information necessary to file permits was collected from various government agencies, and numerous discussions were conducted by CONSOL (see Section 11.0, List of Agencies and Individuals Contacted). Based on these resources and discussions, a list of environmental concerns was prepared and a methodology for preparing the EA was developed. The following areas of concern were analyzed in detail: air quality and odor, water quality, wastewater, aesthetics and land use, traffic and transportation, socioeconomic resources, safety and health of humans and livestock, flood plains and wetlands, flora and fauna, cultural resources, soils and geology, and noise. The *affected environment* in each of the above areas of concern was first examined, and the corresponding *environmental consequences* of actions that would be required under the proposed project were then analyzed.

In addition, Environmental Justice, as described in Executive Order 12898, mandates the fair treatment and involvement of all people, regardless of race, ethnicity, culture, income, or education level; the analyses indicated that no disproportionately high or adverse impacts on low-income or minority populations would result from the proposed action.

3.0 DESCRIPTION OF THE ALTERNATIVES, INCLUDING THE PROPOSED ACTION

3.1 PROJECT BACKGROUND

CONSOL has pioneered the recovery of CBM from the Pocahontas 3 Seam (Southwestern Virginia) and the Pittsburgh Seam (West Virginia, Pennsylvania, and Ohio). The state of the art for the Pocahontas seam is to drill a vertical borehole into the target coal seam and to stimulate CBM production by hydraulically fracturing the seam.

Hydraulic fracturing is a process in which high-pressure water or a water/nitrogen foam is mixed with size-graded sand and pumped into the coal seam. At a critical pressure, the coal fractures and the water/sand mixture is forced into the fractures formed in the seam. Upon completion of the well, the water is recovered, but the sand remains to prop open the fracture. The openings created by the sand allow CBM to flow through the coal seam to the vertical well. Whether the fracture propagates only within the seam or extends beyond the coal seam is dependent on the surrounding geology. For example, in the Pocahontas Seam, the compressive strength of the coal seam is about 206 bar (3,000 psi). The coal is surrounded by roof and coal shales that have a compressive strength of 897 bar (13,000 psi). Hydraulic fractures, therefore, are contained in the coal and can propagate up to 152 m (500 ft) on either side of the well. A successfully hydraulically fractured well is schematically depicted in Figure 3-1.

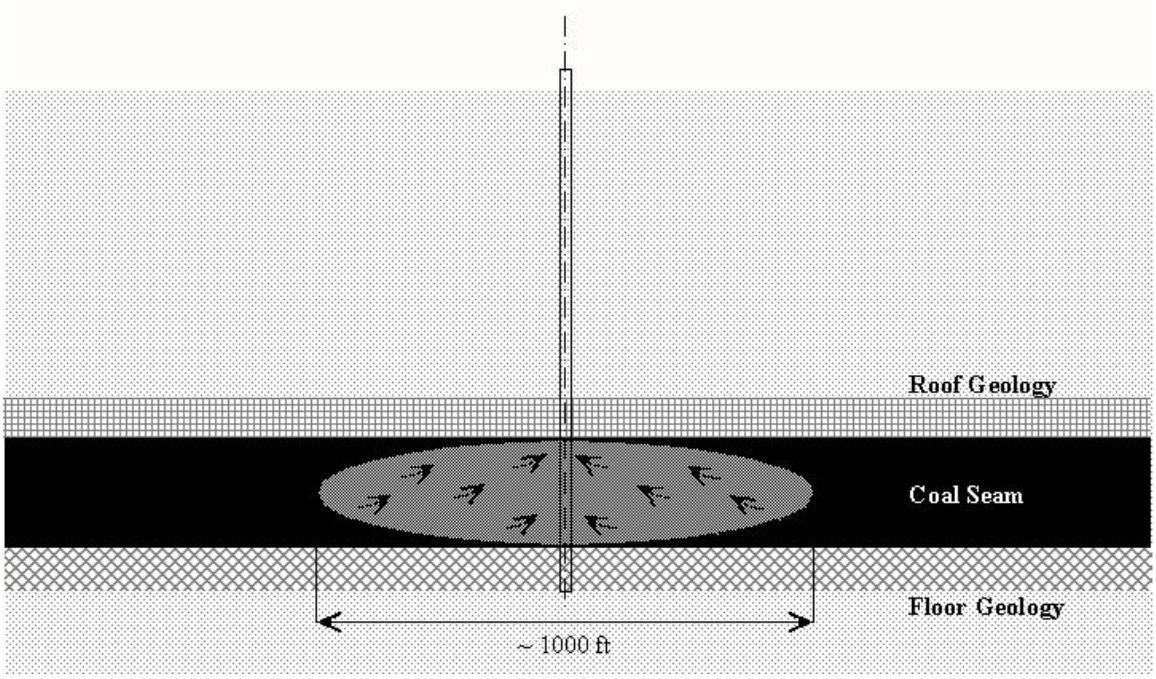

Figure 3-1. Hydraulically fractured coal seam

In the Pittsburgh seam, CONSOL uses guided horizontal drilling to degas longwall panels. Before mining, entries around the longwall panels are developed in the coal seam using

continuous miners. From within the developed entries, horizontal boreholes ranging up to 915 m (3,000 ft) in length are drilled into the panel. The boreholes are then connected to an underground gathering system, which allows CBM to drain to the surface. However, this technique does not allow maximum drainage of CBM, because mining operations typically require that coal in the borehole area be mined within a few months of completing the holes. Consequently, the CBM remaining in the coal is emitted to the atmosphere with the mine ventilation air.

As described in Section 3.2 for the Proposed Action, a combination of vertical wells drilled from the surface and intersected by horizontal wells that extend through the coal seam affords significant potential for CBM drainage and subsequent sequestration of CO_2 gas in the seam.

3.2 DESCRIPTION OF THE PROPOSED ACTION

3.2.1 Overview

The proposed project would evaluate the effectiveness and economics of CO_2 sequestration in an unmineable coal seam located in Marshall County, West Virginia. Directional drilling methods would be used to develop a grid of horizontal wells within an unmineable coal seam. The test site would provide a platform to perform the following:

- Demonstrate horizontal drilling into underground coal seams
- Define effective CO_2 injection methods and procedures
- Evaluate the CO_2 adsorption capacity of seam coal
- Measure the effects of CO_2 injection volume on CBM recovery
- Monitor the concentration of CO_2 in recovered CBM over an extended period of time
- Predict economical drilling strategies to maximize both the sequestration of CO_2 and the recovery of CBM
- Assess the overall effectiveness and cost of CO_2 sequestration and CBM recovery

3.2.2 General Description of the Proposed Action

The proposed project would involve surface development on a small portion of about 836,130 m^2 (9,000,000 ft^2) or 83.6 hectares (206.6 acres) of surface land overlying two coal seams. The lower seam (the Upper Freeport seam) is an unmineable, 4.25-ft thick coal seam at a depth of 1,261 ft. The coal would be degassed and CO_2 gas would subsequently be injected into the lower coal seam. The upper seam (the Pittsburgh seam) is a 6.7-ft thick mineable coal seam at a depth of 669 ft. Coal in the upper seam would be degassed, thus avoiding potential future methane emissions to the atmosphere when the coal is mined. The upper mineable seam is isolated from the lower unmineable seam, into which CO_2 injection would take place. CONSOL owns, or would acquire access rights to, coal in the area to be affected by the project. The development of the site would include symmetrically dividing the lower seam into four equal quadrants using directional drilling methods from the surface.

Excavation and construction contractors would be employed to develop a small surface area of the overall 206.6-acre site before drilling. Surface development tasks would include: (1) installing reliable access roads, (2) installing wastewater holding ponds; and (3) preparing the surface for the drilling rigs, the CBM gas gathering system, and the CO_2 storage/injection equipment.

Although hydraulic fracturing (pressurized water injection) would not be used in the proposed project to stimulate CBM recovery, wastewater from the project would include (1) water collected during well drilling operations and (2) water recovered at the surface during CBM recovery.

CNX Gas Company, LLC (CNX Gas), a subsidiary of CONSOL Energy, would consult with drilling contractors to develop a drill plan that meets the program objectives. The proposed design, as shown in Figure 3-2, would consist of two corner wells (Well A and Well C) drilled vertically from the surface through the two coal seams. At each corner well, two horizontal holes (lateral holes 1, 2, 5, and 6 at Well A, and lateral holes 3, 4, 7, and 8 at Well B) would be drilled through each seam at a 90-degree separation. Each horizontal hole would be up to 915 m (3,000 ft) in length. These four lateral holes would form the test site perimeter for each seam. A third vertical well (Well B) would be drilled at a location centered between Well A and Well C. At the center well, four 305 m (1,000 ft) horizontal holes (lateral holes 9, 10, 11, and 12) would be drilled through the lower seam at 90 degrees of separation, as shown.

Figure 3-3 shows a profile view for Well B along Section A-A (see Figure 3-2). Figure 3-4 illustrates a profile view of all three wells along Section B-B.

A drilling contractor (or contractors) would be employed to implement the site design. In total, three vertical wells and twelve intra-seam horizontal wells would be drilled. The drilling contractor, under the direction of CNX Gas personnel, would provide all necessary equipment, manpower, and expertise to complete the wells.

Assuming standard diameter holes for the horizontal and vertical portions of the wells, the total volume of drill cuttings produced from the proposed wells would be about 14,000 cubic feet. Drilling fluids and cuttings would be collected in a drill pit at each well site.

A gathering system would be designed and constructed to collect and treat all CBM liberated from the seams during the proposed project. The gathering system would include compressors, water/CO_2 removal equipment, measuring equipment, and piping necessary to deliver the captured CBM to a receiving pipeline.

For CBM treatment, water would initially be removed from the recovered CBM by gravity separation at each surface well location. Since the targeted pipeline transmission company requires a maximum CO_2 content of 3%, additional processing equipment would be required to remove any excess CO_2 from the recovered CBM. Gathering pipelines would collect and transport recovered CBM to an off-site CO_2 removal facility. CO_2 removal would be accomplished using either an amine scrubber or molecular sieve-based technology. The CO_2 separation process would likely produce a tail gas that contains elevated concentrations of CO_2. This tail gas could potentially be transported and injected into the center well of the proposed project, thus reducing the volumes of CO_2 delivered to the project by truck.

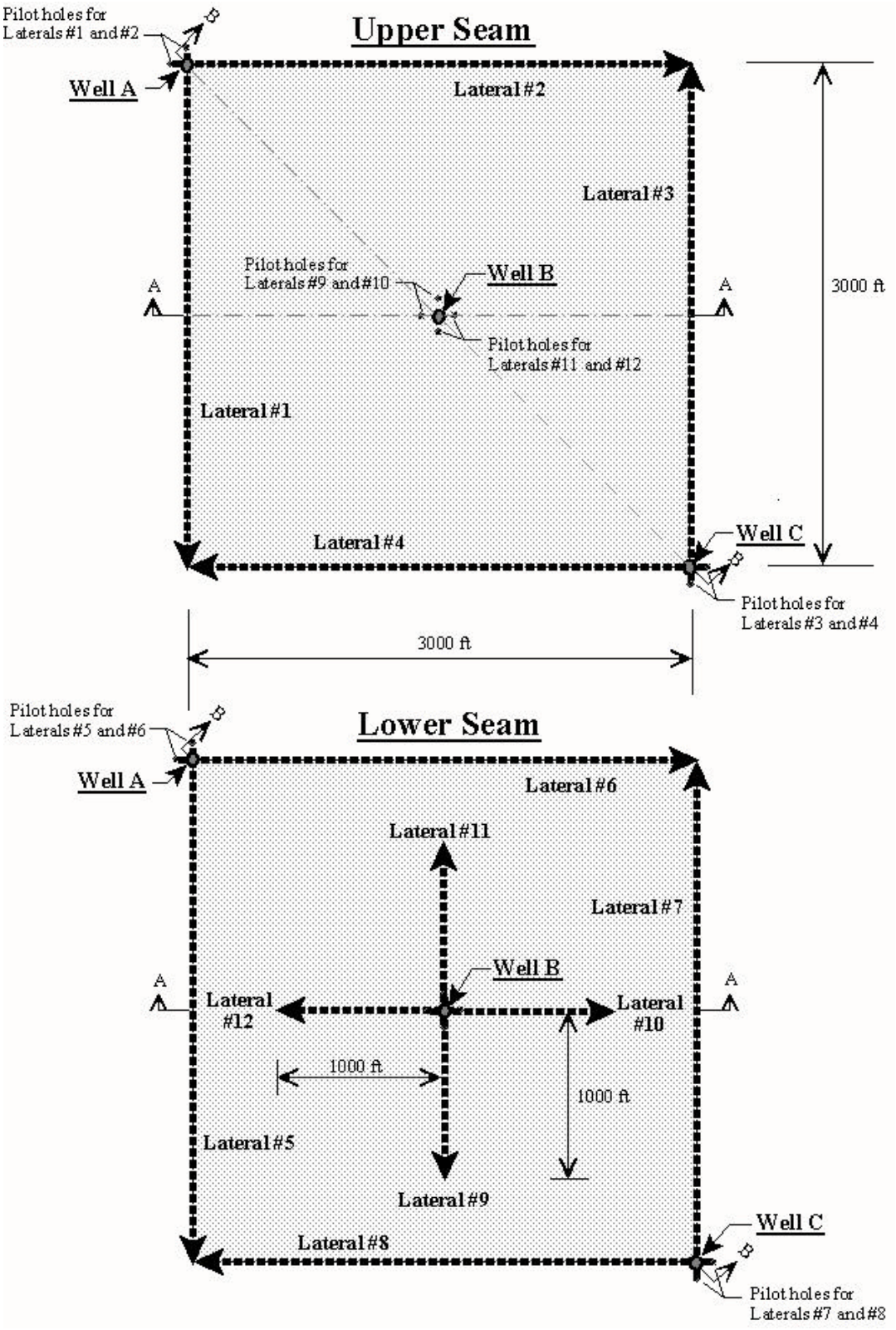

Figure 3-2. Proposed site plan

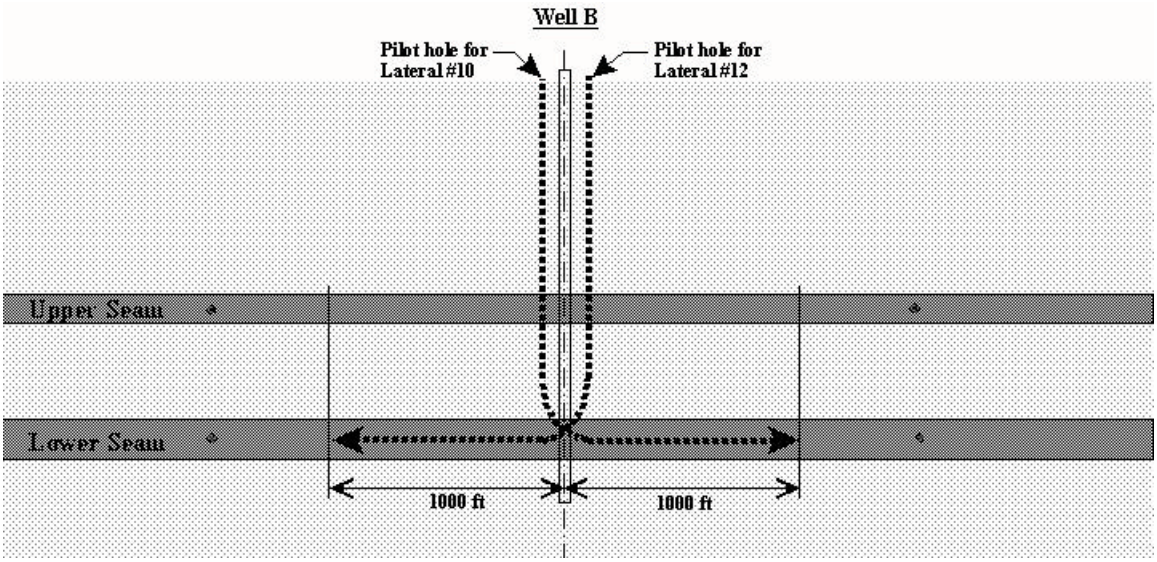

Figure 3-3. Profile view of Well B

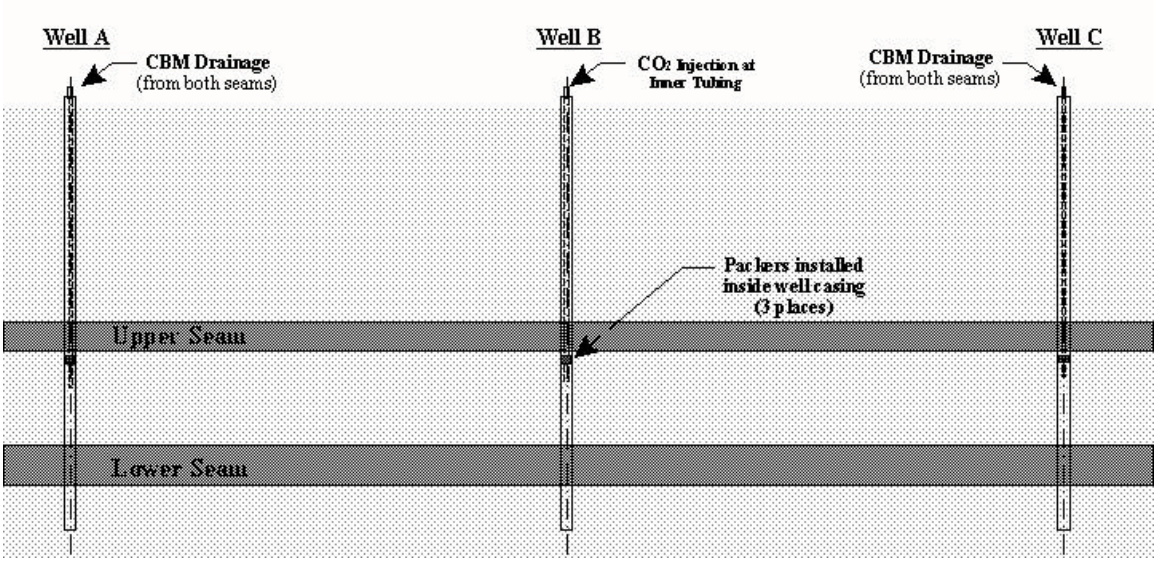

Figure 3-4. Profile view for all three wells

Before CO_2 injection, the reservoir pressure would be depleted by allowing the *in-situ* methane to be drained from the coal seams. The reservoir pressure would be monitored and recorded at the surface. As the reservoir drains, the reservoir pressure would gradually decrease.

A storage facility for bulk liquid CO_2 would be established at the surface of the test site near the center vertical well (Well B). Liquid CO_2 would be delivered by truck to the storage facility on an as-needed basis. A vaporizer and metering station would be established to facilitate the injection of CO_2 into the lower seam. Carbon dioxide gas would be metered and injected into the lower seam through Well B, while CBM drainage would continue at the corner wells (Well A and Well C). The CO_2 injection rate would be closely monitored and incrementally adjusted to maintain a down hole pressure balance. Gradually, the CO_2 gas would penetrate through the lower seam, displace CBM, and adsorb onto the coal. As the lower seam becomes saturated with CO_2, an increased CO_2 concentration would begin to be observed in the CBM collected at the two corner wells. This occurrence would mark the end of CO_2 injection for the project.

Over the total duration of the proposed project, approximately 20,000 tons of CO_2 would be planned for injection into the lower coal seam.

While the unique geology of every well location precludes the ability to accurately project the amounts of CBM and water production, CONSOL estimates, based on previous experience at horizontal well sites, that initial production of CBM and water for the proposed project would be 2.0 million cubic feet per day (MM CFD) and 375 barrels per day (BPD), respectively. CBM recovery would be expected to steadily decline with time, while water production would be expected to sharply decline during the first few months of operation. Assuming 6 years of operation, CONSOL estimates the total CBM and water production for the proposed project to be 1,400 MM cubic feet and 47,700 barrels (about 2 million gallons), respectively. The recovered CBM would be collected at each well, transported through a gathering system, and delivered to a commercial gas pipeline.

The proposed project would include installation of three additional wells for monitoring the stability of the sequestered CO_2 injected into the lower coal seam. The monitoring wells would be drilled outside the perimeter of the project site, as shown in Figure 3-5. Each monitoring well would be equipped with instruments to measure and record CO_2 concentrations in the lower seam. Data would be collected from the monitoring wells before, during, and after CO_2 injection. The primary objective of the monitoring program would be to develop information that: (1) demonstrates the ultimate volume of CO_2 gas that can be sequestered; (2) quantifies the number of moles of CO_2 adsorbed per mole of CBM recovered; and (3) supports determination of reliable technical and economic estimates of CO_2 sequestration potential in unmineable coal seams.

Instruments would be installed at each well site to continuously measure and record the volumetric flow of CBM recovered from both coal seams. On a weekly basis, samples of CBM and water would be collected from each well site and analyzed for methane (CH_4) and CO_2. The results of the analyses would be recorded and plotted throughout the project. In addition to monitoring at the surface, the three monitoring wells that would be constructed outside the perimeter of the project site would be equipped with instruments to measure concentrations of dissolved CO_2 and CH_4 in the ground water of the lower seam under static conditions. The subsurface data would be recorded on a weekly basis before, during, and following CO_2 injection.

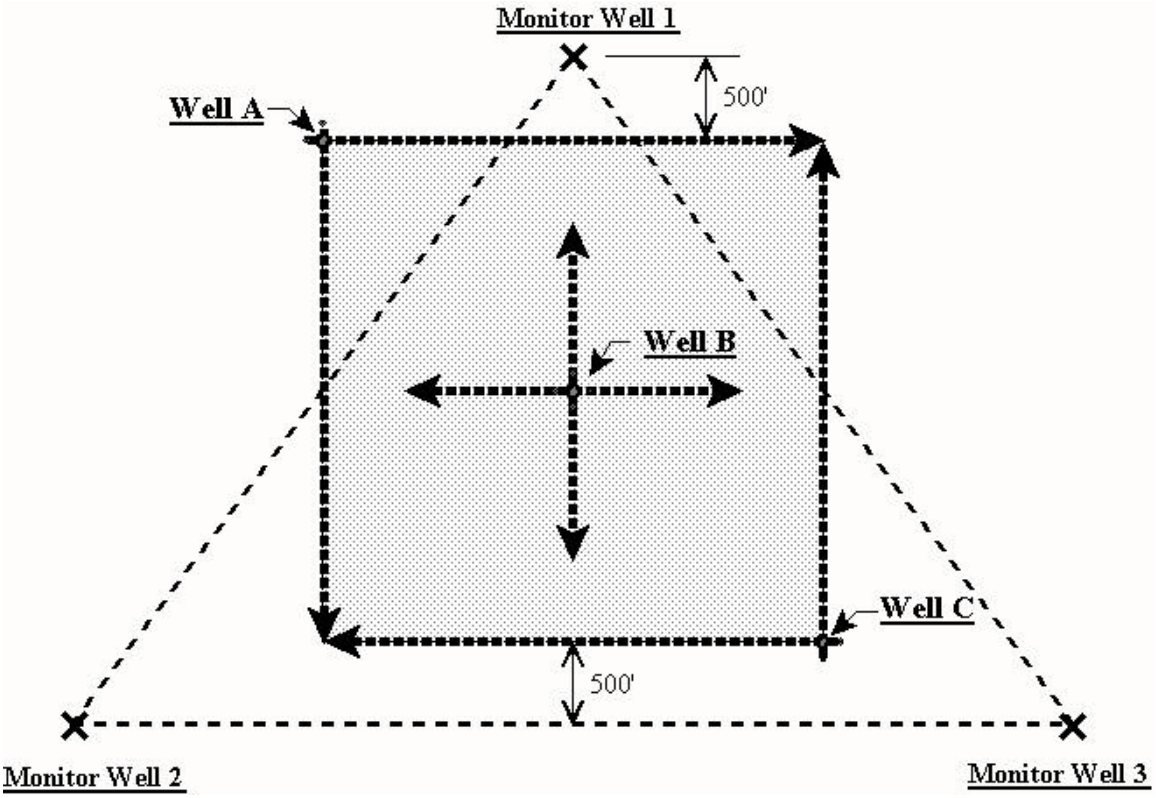

Figure 3-5. Proposed location of CO_2 monitoring wells

3.2.3 Project Schedule

Drilling and well installation would start in late 2002 or early 2003. Construction of the CBM gathering system would be performed following demonstration of CBM production from the completed wells. CBM recovery from both seams would continue following completion of the gathering system and would most likely extend beyond the completion of the 3-year cooperative agreement between DOE and CONSOL. Injection of CO2 would lag behind CBM recovery by approximately one year and continue for more than 2 years. Monitoring would start during drilling and extend to the end of the project.

3.3 DESCRIPTION OF THE PROJECT LOCATION

3.3.1 Project Area and Project Site

The site for the proposed project would be located in Marshall County, West Virginia, in an area of rural Appalachian Plateau woodlands of dendritic topography. This area contains small, rural districts with narrow and winding, asphalt and gravel, state and county roads. The closest occupied dwelling to any of the project well sites would be approximately 300 yards. The surface land near the project site is used for farming and timbering operations.

An abandoned railroad grade right-of-way through the proposed project area is owned by CONSOL. U.S. Route 250, a two-lane asphalt roadway that primarily serves the local districts, is the main road that runs east-to-west through the project area. The location for the proposed project is shown in Figure 3-6. Figure 3-7 depicts the project area, test site, and locations of the three vertical wells.

3.4 ALTERNATIVES TO THE PROPOSED ACTION

The DOE is currently conducting CO_2 sequestration research in four topic areas: (1) sequestration in geologic formations; (2) sequestration in soils and vegetation; (3) ocean sequestration; and (4) sequestration through mineral carbonation. The proposed project falls under category 1, which includes CO_2 sequestration in unmineable coal seams, depleted oil and gas reserves, and deep saline reservoirs.

An alternative to the proposed approach of employing the directional drilling method would be to drill multiple vertical wells from the surface to penetrate the target coal seam. This alternative is described in the following section.

A No Action Alternative was also considered (Section 3.4.2), whereby DOE would not provide funds to support implementation of the proposed project.

3.4.1 Vertical Well Design as an Alternative to the Proposed Action

An alternative approach to directional drilling for research on CO_2 sequestration in an unmineable coal seam would be to use multiple vertical wells drilled from the surface to penetrate the target coal seam. This alternative approach would follow standard practices widely used in the oil and gas industry and would use a five-spot design, whereby four vertical wells would be drilled on the corners of a square plot and a fifth vertical well would be drilled at the center of the square. Each vertical well would be hydraulically fractured at the target seam as discussed in Section 3.1. With this approach, CBM would initially be drained from all five vertical wells. In time, the center well would be converted from a CBM recovery well to a CO_2 injection port. During CO_2 injection, the four corner wells would continue to drain CBM and provide a means to monitor CO_2 breakthrough.

3.4.2 The No Action Alternative

Under the No Action Alternative, DOE would not provide funds for the proposed project. As a result, CONSOL would not be expected to implement the project for enhanced coalbed methane recovery and sequestration of CO_2. Research information to support determination of the technical and economic feasibility of sequestering CO_2 in unmineable coal seams would not be produced.

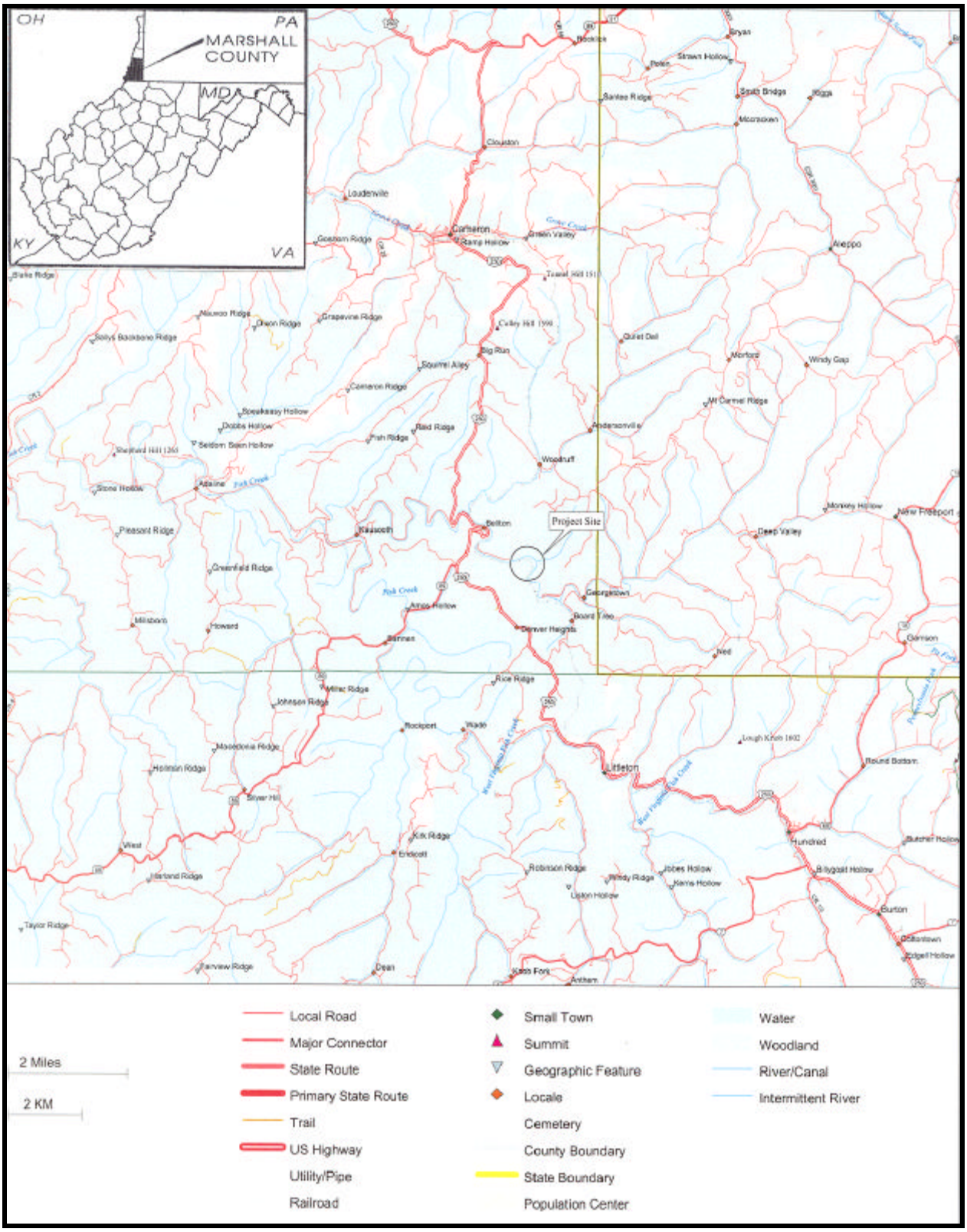

Figure 3-6. Location of the proposed project

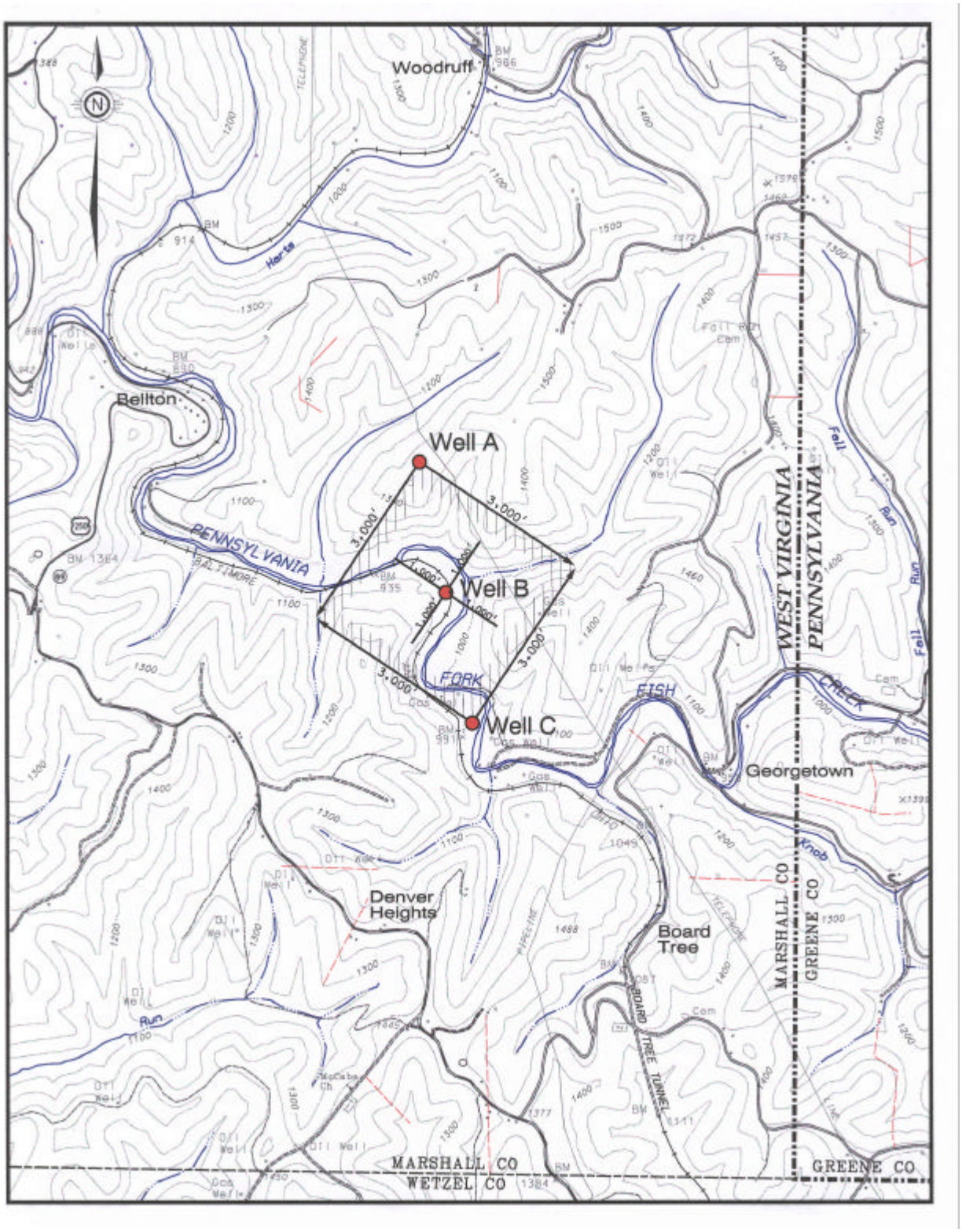

Figure 3-7. Proposed project site

3.5 COMPARISON OF THE ALTERNATIVES

3.5.1 Comparison of the Vertical Well Design to the Proposed Action

The proposed approach for directional drilling offers technical advantages over the alternative vertical well design. Directional drilling would avoid the need for hydraulic fracturing, which is not an effective technique for coal seams in the northern Appalachian region, where the roof and floor strata around the coal seam are typically weaker and cannot confine the fracture in the coal seam. The fractures would most often extend into the weaker geologic strata of the roof, as shown in Figure 3-8.

Fractures in the weaker roof or floor would greatly reduce both the CBM drainage and CO_2 sequestration potential. All CBM drainage and CO_2 sequestration must take place in the coal seam, because the shale and fire clay above and below the coal seam do not contain methane gas and do not have an affinity for CO_2.

A significant advantage of horizontal drilling over hydraulic fracturing is that the volume of coal that can be accessed by a single horizontal well is limited only by its length. The proposed horizontal drilling technique can effectively exploit large sections of an unmineable coal seam regardless of its geologic surroundings. Vertical wells coupled with horizontal extensions offer a means to optimize CBM drainage from the seam, subsequently yielding a substantially larger reservoir for CO_2 sequestration.

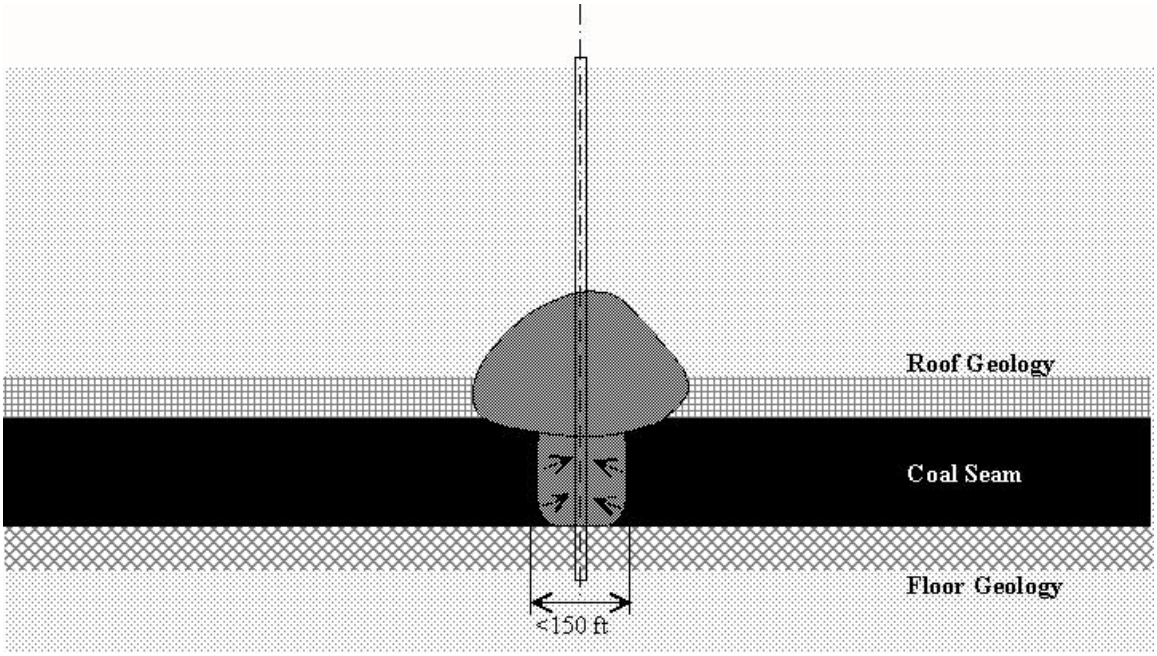

Figure 3-8. Vertical well with fracture extended into the roof

The environmental consequences of installing only vertical wells would be nearly identical to the consequences of the proposed action. Both approaches would require: (1) surface development of the well sites; (2) drilling of subterranean wells; (3) operation of CBM recovery wells; and (4) operation of a CO_2 injection system and monitoring wells. The vertical-drilling-only approach would result in an incremental increase in disturbed land, since five surface locations for drilling would be required relative to three surface locations required for the proposed action. In the vertical-drilling approach, water used for hydraulic fracturing would be delivered by truck and injected into the subterranean strata. Upon completion, the water would be recovered in surface pits, treated, and delivered to an approved drainage basin or an off-site water treatment facility. Any wastewater produced during well construction and operation of the CBM recovery and CO_2 injection equipment under the proposed action would be managed in a similar fashion.

3.5.2 Comparison of the No Action Alternative to the Proposed Action

This section compares and contrasts the potential environmental consequences from construction and operation of the proposed project to those from the No Action Alternative. Table 3-1 provides a comparative summary of the impacts of the alternatives for each resource area. Strategies contemplated for controlling any potential environmental impacts are presented in Section 3.6.

Table 3-1. Comparison of the No Action Alternative and the Proposed Action

Resource	No Action	Construction of the Proposed Action	Operation of the Proposed Action
Air Quality & Odor	No effect	Construction dust and vehicle emissions would result. Odorous gases may be encountered during drilling. Effects would be intermittent and short duration. No degradation of ambient air quality would be expected.	NO_x and CO emissions from combustion of CBM used in gas engines would be below New Source thresholds and defined as *de minimus* engines by DAQ. Underground sequestration of CO_2 greenhouse gas and capture of methane gas would result in a small reduction in atmospheric releases of greenhouse gases.
Water Quality	No effect	Produced water from drilling would be captured, contained, and treated in accordance with regulatory standards.	Drilling would not adversely affect surface water or groundwater. Produced water from operations would be contained and treated for disposition in accordance with regulatory standards.
Wastewater	No effect	Contaminated water would be contained, treated, and managed for disposition in accordance with regulations to ensure non-degradation of the environment.	Wastewater from drilled wells would contain chloride, sodium, and dissolved solids and could be transported off-site for disposal, treated onsite, or re-injected. Transport for offsite treatment and disposal would be preferred. Containment, treatment, and disposition in accordance with regulations would ensure non-degradation of the environment.
Aesthetics & Land Use	No effect	Some local, short-term ground disturbance would result from installing the 3 wells on a maximum of 20 acres of land and from installing CBM connection to a natural gas transmission pipeline. No long-term adverse effects would be expected.	No change.

Resource	No Action	Construction of the Proposed Action	Operation of the Proposed Action
Traffic & Transportation	No effect	Intermittent and short-term increase in traffic would result from a daily maximum of 30 construction workers and deliveries of equipment.	Operations would require fewer personnel, and deliveries would be reduced to 2 truck shipments of CO_2 per day.
Socioeconomic Resources	No effect	Some local, short-term increase in employment and retail activity. Lease payments would be provided to property owners for access rights-of-way to the well sites, as needed.	Higher and better use of underground mineral resource through displacement and capture of methane gas. Royalty payments would be paid to coal owners for recovered CBM.
Safety & Health	No effect	Hazards to workers would be similar to those for well site construction and well drilling activities. No adverse impacts would be expected.	General worker exposure to routine well site operations would not be anticipated to result in adverse impacts.
Floodplains & Wetland	No effect	No wetlands exist in areas to be affected by the project. Wells A & C would be above the 100-year and 500-year floodplains. Well B would be above the 25-year floodplain but within the 100-year floodplain.	Installed facilities would have the same wetland and floodplain relationships as the well construction sites.
Flora & Fauna	No effect	Small, local, and short-term disruption of flora and fauna would result. No impacts on rare, threatened, or endangered species or habitats would be expected.	Small, local, and short-duration impacts on flora and fauna would result. No impacts on rare, threatened, or endangered species or habitats would be expected.
Cultural Resources	None exist	No effects.	No effects.
Soils & Geology	No effect	Small, local, and short-term disruption of soils would result, and the sites would be reclaimed following project completion. Semi-permanent wellbores drilled into subsurface would be cased and cemented to preserve geological integrity.	CBM would be drained from 2 coal seams beneath 206.6 acres of land surface and CO2 would be injected in to the lower unmineable coal seam for displacement of CBM and long-term sequestration.
Noise	No effect	Local and infrequent well-installation noise would be limited to 14-day duration and would be attenuated by topography. No adverse consequences would be expected.	No appreciable change from current noise levels and sources.

3.6 ANTICIPATED CONTROL STRATEGIES

The proposed project would involve three separate and discrete well sites. Construction and operation of each well would be strictly regulated by the West Virginia Department of Environmental Protection's Office of Oil and Gas (WVDEP OOG). The principal environmental control strategies would be driven by implementation of OOG regulations specific to the project action at each well site.

Every planned well would require a work permit, which regulates the management of water quality both on the surface and in the subsurface, from the OOG. Each permit also sets limits on the effluent waters.

For each well site, a specific *Erosion and Sediment Control Plan* (ESCP) applicable for the lifetime of the proposed project would be required. The ESCP would include designs for preventing soil erosion and the release of sediment-laden runoff into area watercourses. The ESCP would also include construction specifications for containment dikes and site grading for the prevention, capture, and control of any potential spills of contaminated material.

Any produced water (groundwater) encountered either during construction (well drilling) or operation would flow to on-site containment facilities. The collected and treated water could be hauled offsite or injected into underground injection control wells. Soil sediment generated on-site would be directed to and contained within constructed sediment ponds for settling. The access roads built to the well sites would be ditched for drainage and sediment control.

The OOG and/or the West Virginia Division of Air Quality (DAQ) fwould regulate venting of naturally occurring methane gas and use of methane as a fuel source. To protect ambient air quality, DAQ requires that a Permit Determination Form (PDF) be filed for reviewing any proposed use of CBM as fuel.

The regulatory requirements of the OOG and DAQ are well known and codified, and they are enforced by inspectors that regularly visit sites during project construction and operation. The environmental compliance for these sites would be enforced by OOG inspectors during both the construction and operation periods. A list of the approvals/permits potentially required for the project is tabulated in Table 3-2.

Table 3-2. List of approvals/permits potentially required for the project

Subject	Topic of the Approval Being Sought	Approving Authority	Description Of Permit/Approval Required
1	Authority to Survey Project Site And Facilities and Well Sites	Public And/Or Private Land Owners	Permission to enter upon the land.
2	Authority to Build Access Roads to Project Site From State Or County Roads	West Virginia Division of Highways (WVDOH)	This is a WVDOH "Driveway" permit.
3	Authority to Build Access Roads Across Private/Public Lands to Project Site	Private Land Owners/Custodians Public Land Owners/Custodians "Miss Utility" industry consortium**	Leases/Road Grants/Rights-of-Way. The routes of existing sub-surface utilities would be flagged on the surface of the ground.
4	Authority to Disturb Land for Well Drilling	WVDEP OOG	WVDEP OOG Oil & Gas Well Work Permit Regulations: 22CSR6 and 22CSR21
5	Authority to Drill Vertical "Pilot" Wells [Oil & Gas Well Work Permit]	WVDEP OOG	WVDEP OOG Oil & Gas Well Work Permit Regulations: 22CSR6 and 22CSR21
6	Authority to Drill Horizontal 'Slant' Wells [Oil & Gas Well Work Permit]	WVDEP OOG	WVDEP OOG Oil & Gas Well Work Permit Regulations: 22CSR6 and 22CSR21
7	Authority to Drill CO_2 Injection Wells	WVDEP OOG	WVDEP OOG Oil & Gas Well Work Permit Regulation: 22CSR6
8	Authority to Drill Coal-Core Wells	WVDEP Division of Mineral Resources (WVDEP DMR)	WVDEP DMR Prospecting Permit Occasionally required to prospect land. Granted usually ahead of an application to develop land for mineral [coal, stone] removal. Regulations: 22CSR3 and 22CSR6
9	Authority to Inject CO_2 Into Coal Seam	WVDEP OOG	An "Underground Injection Control" [UIC] Permit
10	Authority to Construct Water and/or Gas Pipelines	Private & Public Land Owners/Custodians, Local and/or Regional Municipality "Miss Utility" industry consortium**	Leases/Rights-of-Way, Building Permits, which document the routes of existing sub-surface utilities
11	Authority to Move Well-Drilling and Associated Equipment Along Public and Private Roads	US Dept. of Transportation (US DOT), WVDOH, Private & Public Land Owners/Custodians	These transportation permits would be secured by contractors owning and moving the equipment. Leases/Road Grants/Rights-of-way
12	Authority to Move CO_2 Containers and Associated Equipment Along Public and Private Roads	US DOT, WVDOH, Private & Public Land Owners/Custodians	These transportation permits would be secured by contractors owning and moving the equipment. Leases/Road Grants/Rights-of-way
13	Authority to Collect, Treat and Discharge Produced Water	WVDEP, West Virginia Division of Water Resources (WV DWR) WVDEP OOG	WVDEP OOG Oil & Gas Well Work Permit, NPDES Permit Regulation: 22CSR6

Subject	Topic of the Approval Being Sought	Approving Authority	Description Of Permit/Approval Required
14	Authority to Collect, Treat and Discharge Waste Water	Local and/or Regional Municipality	Sewage Treatment & Discharge Permit
15	Requirement to Monitor Surface and/or Groundwater on or About the Project Site	WVDEP, WVDWR WV Division of Mining and Reclamation	NPDES Permit NPDES; Article 11
16	Authority to Construct Facilities on the Project Site	Local and/or Regional Municipality, Private & Public Land Owners/Custodians	Building Permits. Leases/Road Grants/Easements/Rights-of-way
17	Authority to Vent Methane Gas	WVDEP Division of Air Quality (WVDEP DAQ)	WVDEP DAQ determination as to whether an Air Quality Permit would be required for this Project. WVDEP DAQ Permit Regulation: 45CSR13
18	Authority to Vent CO_2 Gas	WVDEP DAQ	WVDEP DAQ determination as to whether an Air Quality Permit would be required for this Project. WVDEP DAQ Permit Regulation: 45CSR13
19	Authority to Vent Gas Compressor Engine Exhaust Gases	WVDEP DAQ	WVDEP DAQ determination as to whether an Air Quality Permit would be required for this Project. WVDEP DAQ Permit Regulation: 45CSR30
20	Requirement to Control Erosion and Sediment on and About the Project Site	WVDEP OOG	This is part of WVDEP OOG Well Work Permit. Regulation: 22CSR6
21	Requirement for a "State Historic Preservation Office," Cultural and Archeological Survey of the Project Site	West Virginia Division of Culture and History (WVDCH)	A State Historic Preservation Office determination that no significant cultural or archeological impacts would result from the Project.
22	Requirement for a "Wildlife Resources Lands Inquiry Response"	West Virginia Division of Natural Resources (WVDNR)	A determination by the WVDNR of the Project's impact on endangered species.
23	Authority to Bore Under a Roadway for Gas Pipeline Construction	WV DOH	Under-Road (Highway) Boring Permit
24	Authority to Bore Under a Railroad for Gas Pipeline Construction	Specific Railroad Line Owner(s)	Under-Railroad Boring Permit

** "Miss Utility" refers to a public service available in West Virginia that identifies and flags buried utility lines in advance of construction activities.

4.0 AFFECTED ENVIRONMENT AND THE ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

In the following sections, the affected environment is described in terms of air quality and odor, water quality, wastewater, aesthetics and land use, traffic and transportation, socioeconomic resources, safety and health, flood plains and wetlands, flora and fauna, cultural resources, soils and geology, and noise. The corresponding environmental consequences of the proposed action are stated and analyzed.

4.1 AIR QUALITY AND ODOR

This section describes the regulations governing air quality, including odorants and odorant sources, and addresses the potential impacts of the proposed project on local and regional air quality. This section also addresses the project's potential to affect and manage atmospheric concentrations of greenhouse gases.

The guiding requirements for management of air quality were established by the Clean Air Act (CAA) Amendments of 1990. The CAA provides the framework for the national, state, and local regulatory efforts to manage air quality. The U.S. Environmental Protection Agency (EPA), under the authority of the CAA, set the prevailing standards for air quality. These standards are known collectively as the National Ambient Air Quality Standards (NAAQS).

The NAAQS define levels of air quality and establish requisite margins of safety necessary to protect public health (primary standards) and public welfare (secondary standards) from any known or anticipated adverse effects of a criteria pollutant.

The EPA, in conjunction with state and local oversight agencies, are responsible for ensuring that the NAAQS are met. As designated by the EPA, the West Virginia Division of Air Quality (DAQ) is responsible for protecting West Virginia's air quality.

Major stationary sources of air pollution and major modifications to major stationary sources are regulated under the CAA, Title V, which requires an air pollution control permit to be obtained before commencing construction. Typically, a well site, whether it involves injection, monitoring, or capture, is not classified in the regulations as a major stationary source.

The proposed project includes plans for the probable placement of semi-permanent (duration-of-project) facilities (1) to vaporize liquid carbon dioxide in a closed system for underground injection and (2) to burn captured methane gas in gas-fired engines that drive compressors. Due to the probable placement of semi-permanent facilities, the WVDEP DAQ regulations provide for a Permit Determination Form (PDF) process, which involves a New Source Review, whether the major source or modification is planned for an area that achieves NAAQS (attainment or unclassified area) or that exceeds NAAQS (non-attainment area).

Under the CAA, a new source is considered major if it has the potential to emit any pollutant regulated under the CAA in amounts equal to or exceeding the specified major source thresholds

of 100 or 250 tons per year (tpy), which are predicated on the source's industrial category. The DAQ's PDF process is used to make this New Source determination.

The West Virginia Air Quality regulations are documented in Chapter 45 of the Code of State Regulations (45CSR1-38), and the regulations applicable to the project are listed in Table 4-1.

Table 4-1. West Virginia regulations governing the control of air pollution

RULE	DESCRIPTION
45CSR2	To Prevent And Control Particulate Air Pollution From Combustion Of Fuel In Indirect Heat Exchangers
45CSR2A	Testing, Monitoring, Recordkeeping And Reporting Requirements Under 45CSR2
45CSR4	To Prevent And Control The Discharge Of Air Pollutants Into The Open Air Which Causes Or Contributes To An Objectionable Odor Or Odors
45CSR6	To Prevent And Control Air Pollution From Combustion Of Refuse
45CSR7	To Prevent And Control Particulate Matter Air Pollution From Manufacturing Processes And Associated Operations
45CSR8	Ambient Air Quality Standards For Sulfur Oxides And Particulate Matter
45CSR10	To Prevent And Control Air Pollution From The Emission Of Sulfur Oxides
45CSR10A	Testing, Monitoring, Recordkeeping And Reporting Requirements Under 45CSR10
45CSR13	Permits For Construction, Modification, Relocation And Operation Of Stationary Sources Of Air Pollution
45CSR17	To Prevent And Control Particulate Matter Air Pollution From Materials Handling, Preparation, Storage And Other Sources Of Fugitive Particulate Matter
45CSR21	Regulation To Prevent And Control Air Pollution From The Emission Of VOCs
45CSR30	Requirements for Operating Permits
45CSR30A	Deferral of Non-major and Area Sources from Permitting Requirements

4.1.1 Affected Environment

Through discussions with individuals at DAQ (see Section 11.0, List of Agencies and Individuals Contacted), the project site in Marshall County was determined to be within an attainment area for all criteria pollutants, including carbon monoxide (CO), ozone (O_3), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM_{10}).

At the local level, the regulation of air pollution odors occurs indirectly through Nuisance Laws, which are based on the right of all landowners to enjoy their property and be free from unreasonable interference.

4.1.2 Environmental Consequences

Construction Impacts

Construction activities would include excavation, road construction, well drilling, and associated vehicle traffic. These construction activities would be expected to produce short-term, low-level, intermittent, and transient emissions of nitrogen oxides (NO_x), CO, and PM_{10}. During construction, an intermittent emission of methane gas may occur. In rare instances, sulfur compounds (SO_2 and/or hydrogen sulfide (H_2S)) may be encountered during construction (drilling).

Since the project would require gas-fired engines to drive compressors and vaporizers, a PDF would need to be filed with WV DAQ prior to start-up of the project. If the WV DAQ determines (based on a review of the PDF) that air quality permits would be required, CONSOL would be responsible for obtaining the required permits. However, the activities associated with the project principally involve well-work activities (well drilling, well completion, well management, and underground injection control). These activities are governed by the OOG, which has established regulations requiring specific well-work permits and inspections to manage air quality.

The strongest odors expected from the project would most likely be generated during well drilling, when naturally occurring methane may encountered. In rare instances, SO_2 and/or H_2S may also be encountered. While CBM is an odorless gas, CBM encountered during well drilling is often accompanied by the odor of the subterranean environment. If any odor of these gases should be detected during project construction, immediate containment of the gases would be implemented, in accordance with OOG regulations.

Only local and short-duration increases in traffic would be required for construction, which would result in no appreciable effects on ambient air pollution concentrations. In addition, dust potential created during construction would be controlled by the application of water sprays at the construction site(s) and access roads, as necessary. Any methane gas encountered during the construction activity would be flared. Similarly, any detected sulfur-containing gases would be immediately shut-in and contained in accordance with OOG permits. Due to the short-term nature of the construction activities, no degradation of ambient air quality would be expected.

Construction activities would be regulated by the WVDEP OOG through the requisite permitting processes and required inspections. Additionally, due to proposed use of gas-fired engines, the WVDEP DAQ would require preparation of a Permit Determination Form application. The WVDEP OOG and DAQ, through the required permits and subsequent inspections, would regulate all construction activities.

Operation Impacts

Based on similar projects (new-well drilling, underground injection, gas capture, and gas-fired engines' operations), the estimated air pollutant emissions for the proposed project would be substantially below the New Source Review thresholds. Additionally, the DAQ regulations provide exemptions for certain infrequent, intermittent, and short-time activities (i.e., well drilling) and for certain *de minimus* gas-fired engines (which are defined in the regulation). A *de minimus* engine, by definition, produces pollutants at levels well below regulatory thresholds.

The proposed project would not be a major New Source, and an Air Quality permit under the West Virginia program administered by the WV DAQ may not be required. However, some sources that are non-major may be regulated under the DAQ Air Contaminant Discharge Permit program, pursuant to the related statutes for stationary sources found in the West Virginia 45 CSR.

Air Contaminant Discharge Permits are primarily issued to regulate non-major sources of air emissions containing (1) more than 5 tpy of particulate (PM_{10}); (2) more than 10 tpy of any one gaseous pollutant but less than 100 tpy of any regulated pollutant; (3) 10 tpy of a single hazardous air pollutant; or (4) 25 tpy of combined hazardous air pollutants. The WVDEP DAQ Permit Determination Form for the proposed project would address the non-major source issues and determine the requirements for an Air Quality permit.

The most significant sources of air pollutant emissions from the proposed project would be from combustion of captured CBM used as a fuel source in gas-fired engines that would drive compressors or vaporizers. Approximately 10 small gas-fired engines would be required for the project. These engines would power both well-pumping units (intermittent operations) and small compressors that would deliver the recovered CBM to off-site markets. In addition, one small gas-fired vaporizer would be required at the CO_2 injection well site.

Based on similar-sized projects, CONSOL estimates that the cumulative operating horsepower of installed engines would be 42 horsepower. Using the EPA emission factor of 10 grams NO_x per horsepower-hour, the total NO_x emissions for continuously operated engines would total 4.05 tpy, which is well below the New Source thresholds. The gas-fired engines would be *de minimus* engines, as defined by the DAQ regulations.

All operating equipment for the project would be operated in a manner consistent with the prevention of emissions of odorous matter and/or the creation of nuisance conditions. In the unlikely event that a nuisance condition would develop and be verified by the WVDEP DAQ, immediate process modifications would be implemented and/or additional or different control equipment installed, as necessary.

Except for vehicular traffic, the temporary and short-term well drilling activities, and the exhaust emissions from gas-fired engines, all encountered or produced effluents would be sealed from outside air. Under conditions that might result in venting odors to the outside air, the provisions of the WVDEP OOG permitting processes (for well drilling) and the PDF processes (for the total project) would prevail.
The liquid carbon dioxide to be injected underground would be delivered in a sealed tank on a truck and pumped via an air-sealed connection through a vaporization assembly and an airtight

underground injection well into the subterranean coal seam. The captured effluents from the project would always move within closed, airtight collection and/or monitoring systems.

The OOG permit regulations for well drilling require that well drilling rigs be equipped with H_2S sensing instruments, which are required to be sensitive to one part-per-billion (ppb) for the detection of sulfur compound gases encountered naturally (albeit rarely) during drilling. Because the threshold concentration for human recognition of H_2S odors is about 5 ppb, the on-rig-sensing device would detect the compound before human recognition, an audible alarm would sound, drilling would cease, and required actions would be initiated to prevent the escape of the gas, in accordance with OOG regulations. The well would be automatically shut-in to seal the well bore and prevent the release of additional H_2S gas. Following those preventive procedures, an H_2S response team equipped with personal protective equipment would be activated to determine the magnitude of the H_2S hazard and to evaluate additional remedial actions. Two possible outcomes could result: (1) drilling could resume while the H_2S gas is flared or (2) the well bore could be plugged and the well site abandoned.

4.1.3 Global Warming

The objective of the proposed project is research for containment of greenhouse gas (particularly CO_2) emissions, which some scientists believe are contributing to global climate change. The purpose of the proposed project is to test an approach that could permanently sequester CO_2 underground in unmineable coal seams.

4.2 WATER QUALITY

This section provides a general description of the watershed basin and the existing concerns for well drilling and underground fluid injection.

4.2.1 Affected Environment

Since the project would involve construction of surface facilities and drilling of subsurface wells, the Affected Environment would extend from the surface watershed into the subsurface groundwater regime. The following four principal concerns would exist for water effects:

- potential degradation of water quality in the surface drainage basin
- potential degradation of water quality in the subsurface groundwater regime
- potential diminution of water volume and flow in the subsurface groundwater regime
- introduction of substandard subsurface water into the surface watershed

The project site would be located within the Pennsylvania Fork of the Fish Creek drainage basin. Pennsylvania Fork is a small perennial stream that flows into the larger Ohio River drainage basin. The tributaries of Fish Creek are predominantly small and very short (less than one mile), intermittent, and ephemeral streams of dendritic pattern in low-relief dendritic topography. The project site would comprise approximately 9,000,000 square feet (approximately 200 acres) of land within this drainage basin.

The subsurface groundwater environment is comprised of two regimes: (1) a freshwater regime that exists from just beneath the surface down to a depth of approximately 400 ft and (2) a brine water regime that exists below the terminal penetration of the freshwater regime down to a depth that depends on the nature of the rock units in the subsurface.

The terminal depth of the subsurface freshwater regime (400 ft) results from soil, regolith, and rock seals that prevent any potential freshwater aquifers from percolation, infiltration, and flow to greater depths.

The subsurface brine water regime is generally situated in porous, and sometimes permeable, rock units and occasionally co-exists with hydrocarbons (oil, gas, and gas condensates) in specific hydrocarbon reservoirs. The brine water regime is usually separated and isolated from the ground surface (and the surface watershed) by intervening layers of impermeable rock. Subsurface groundwater would be a potential concern since wells drilled into the subsurface could intercept brine water reservoirs and deliver those waters to the surface.

Section 303 of the Clean Water Act requires states to set water quality standards for protecting existing and beneficial uses for surface water bodies. In West Virginia, the Department of Environmental Protection, Division of Water Resources (DWR), is charged with oversight of the State's surface water and groundwater resources. The DWR mission is "to preserve the physical, chemical and biological integrity of surface and ground waters, considering nature and the health, safety, recreational, and economic needs of humanity." The DWR oversees the maintenance of Total Maximum Daily Load (TMDL) standards for the State's watersheds.

The WVDEP empowered the OOG to regulate and oversee the processes by which wells are drilled. The OOG has established a well-permit application process and standards for protection of surface and groundwater quality and quantity during well drilling. The OOG works in concert with the DWR to assure that any surface disturbance of the drainage basin and any subsurface penetration of groundwater regimes meet the DWR anti-degradation standards established for both surface watersheds and subsurface groundwater regimes.

The proposed project would be substantially controlled by requirements established by the OOG. Facilities to be constructed for conducting the project would consist of (1) pilot wells, (2) horizontal wells, (3) methane recovery wells, (4) monitoring wells, (5) an underground injection control well, and (6) recovered methane pipeline gathering systems. The OOG would regulate all of these operations.

The OOG permit application process would require that the project anticipate, design, construct, operate, and maintain (1) surface erosion and sediment control structures, (2) subsurface (well bore) casing and cementing programs, and (3) surface and subsurface water holding and treatment facilities (as required) to assure anti-degradation of surface and groundwater resources.

All four of the principal concerns for water affects in the structure of the project would be managed within the context of the OOG permit process.

4.2.2 Environmental Consequences

In West Virginia, over 100,000 wells (exclusive of simple potable groundwater wells) have been drilled into the subsurface over a period of time exceeding one hundred years. During that time, the State of West Virginia has developed a body of law and promulgated regulations specific to the anti-degradation of surface water and groundwater directly applicable to every project that could potentially affect water in the state. The purposed project would operate under the promulgated regulations through permits issued for the lifetime of the project.

The OOG maintains an inspection corps to enforce water quality regulations, with specific personnel from that corps responsible for a designated geographical region. The specific inspector assigned to the project site would:

- review the applications for well-work permits, which would permit and regulate the construction of project wells and associated facilities
- inspect the project sites before drilling the first well or constructing the first facility
- oversee (1) site preparation, (2) construction and maintenance of erosion and sediment control systems, (3) well drilling, (4) insertion of groundwater protection casing and cement, (5) management of produced groundwater, and (6) reclamation of the well sites
- periodically inspect the sites for the duration of the project, and
- oversee the final abandonment and reclamation of the sites upon termination of the project

As an outcome of the stringent regulatory process, no deleterious impacts on the surface waters or groundwater resources on, under, or about the project site would be anticipated.

4.3 WASTEWATER

This section describes (1) the freshwater that would be used and discarded during well drilling and (2) the groundwater that would be delivered to the surface via the well bores. No sewage wastewater would be produced during the project.

4.3.1 Affected Environment

The proposed project encompasses approximately 9,000,000 ft^2 (about 200 acres) of area, principally in the subsurface. Three surface-well sites, each ranging in size from 1 to 5 acres, would be used for well drilling, underground injection, groundwater and methane gas capture, and monitoring. The proposed surface sites for the project are grass-covered, undeveloped areas, with no industrial development or wastewater sources.

4.3.2 Environmental Consequences

Construction Impacts

During well drilling, subsurface formation groundwater may be encountered. The well bore would capture and direct the water to the surface. The water would be directed, via flow lines, into a constructed pit and contained for the duration of the well drilling activity. Wastewater would result from water used and discarded during well drilling operations and water pumped to the surface during CBM recovery.

Drilling fluids and drill cuttings would be collected and contained in drill pits positioned within 100 ft of each well location. The proposed drilling scheme includes three closely grouped well locations that would require 3 drill pits. The pits would be 20 ft wide and 100 ft long, with a 15 ft depth, and be lined with plastic. Upon completion of drilling, the drilling waste would be treated within the drill pit and ground-dispersed in accordance with OOG regulations. An approved contractor would be used for pit treatment and reclamation activities. This approach represents standard practice for 6 previously drilled CBM wells in West Virginia.

Wastewater produced during well construction would either be (1) treated onsite in constructed pits to a quality specification dictated by OOG regulations and then delivered into an approved drainage basin or (2) transported offsite to a facility dedicated to water treatment and disposal. The option of onsite water treatment would not be preferred. Rather, two offsite disposal scenarios would be considered – transporting the water by truck to a commercial disposal facility or delivering the water to an existing (or constructed) underground injection well. Selection of the project approach would be based on the overall economics associated with the two disposal options. The costs of hauling produced waster to a commercial disposal facility would be weighed against the costs associated with water disposal using an underground injection well.

Operation Impacts

During project operation, water would be produced from the wells. At the surface, facilities would be constructed at or near the well heads to collect the produced water. Any water produced by the well during project operation would be collected in holding tanks that would be constructed of fiberglass or steel, with capacities of 100 barrels or 200 barrels, respectively. Analyses of produced water from prior CBM projects indicate high concentrations of chloride, sodium, and total dissolved solids.

Water produced (wastewater) during project operation could be either (1) delivered via piping or truck transport to a common onsite treatment facility, (2) transported offsite for treatment and disposal, or (3) re-injected into the subsurface via constructed (drilled) underground injection control wells. At present, onsite water treatment would not be anticipated. All produced water would undergo disposal offsite, and thus no treated water would be discharged to Fish Creek.

Management of the wastewater encountered during project operations would be performed in accordance with the OOG permit and inspection protocols.

4.4 AESTHETICS AND LAND USE

4.4.1 Affected Environment

The project site would be in located in an area of rural Appalachian Plateau woodlands containing rural districts with narrow and winding asphalt and gravel state and county roads. The surface land in the areas surrounding the proposed project site is principally used for small, independently owned and operated farms (vegetable and livestock) and timbering operations. CONSOL owns an abandoned railroad grade right-of-way through the project area.

The principal subsurface land use is oil well and gas-well drilling and production by small, local and regional, unrelated, independent oil and gas companies. A pipeline gathering system would connect the widely dispersed wells to larger regional and interstate gas transmission pipelines. In addition, subsurface coal mining operations with associated CBM production operations exist in the area. Buried natural gas pipelines, overhead regional telephone lines, and electric transmission lines cross the project area.

One rural U.S. highway (U.S. Route 250), a narrow and winding two-lane asphalt roadway, passes through the project area. U.S. Route 250 serves primarily the local townships.

4.4.2 Environmental Consequences

Because the project site would be located in a rural area, no zoning permits would be required for the proposed action. Oil well and gas well drilling is a well-established practice in the local area and regionally. The scope and magnitude of the proposed well drilling activity would be similar to activities currently being conducted in the area by independent oil well and gas-well operators. Through permitting and inspection requirements, the OOG would fully regulate the proposed well-drilling protocol. The access road (the abandoned railroad grade) leading to the proposed CO_2 injection facility would be upgraded to manage the increased vehicular traffic anticipated during both the construction and operation phases of the project.

CONSOL would use the abandoned railroad grade as the principal accessway to the Well B site, where the equipment for underground injection control of CO_2 would be installed. The land surrounding the railroad grade is privately owned by a variety of individuals and families.

The two corner wells (Wells A and C) designated for CBM capture and sequestration monitoring would be drilled on private lands under leasehold provisions. Any required interconnecting pipelines would be constructed in the subsurface under rights-of-way and easement agreements. CONSOL owns or would obtain rights to coal into which the CO_2 would be injected.

Wells A and C, the 3 monitoring wells, and any underground injection control well for the disposal of wastewater would be accessed along county secondary asphalt and gravel unimproved roadways that would be upgraded as necessary to accommodate project equipment and vehicles.

The equipment to be installed would include a 50-ton CO_2 storage tank that would occupy an area of 1,600 ft^2 (20 ft by 80 ft).

As necessary, gravel access roads would be graded across private lands to all well sites in accordance with the OOG permits and private leasehold agreements. The contracting companies

for well drilling and CO_2 delivery would be responsible for acquiring all roadway permits, road grants, easements, or rights-of-way necessary to access work sites.

An option for CBM recovery would be to construct a pipeline that connects to Dominion pipeline TL-342, which moves gas in a northeastern direction through Wetzel County. A potential connection point would be where the Dominion pipeline crosses an abandoned railroad right-of-way west of Hundred, WV. This location would be approximately 5 miles southeast of the proposed project location. For any new pipeline construction, the existing right-of-way would be used as much as possible to minimize land disturbance.

During both the construction and operation phases, the project would have minimal effects on land use or visual resources in the area of the proposed site.

4.5 TRAFFIC & TRANSPORTATION

4.5.1 Affected Environment

As shown in Figures 3-6 and 3-7, the project site would be within a remote, woodland area of low to moderate relief. U.S. Route 250 would be the main highway through the project area, with narrow (two-lane) asphalt and gravel county roads departing U.S. Route 250 to serve the region around the project site.

4.5.2 Environmental Consequences

Access to the proposed well sites would be provided by three constructed gravel access roads. The road to Well B would depart U.S. Route 250 and proceed along an abandoned railroad grade (owned by CONSOL) that parallels a perennial stream, the Pennsylvania Fork of Fish Creek. The abandoned grade would be improved and maintained sufficiently to host both construction and operational traffic. During construction, the access road would host large construction vehicles – bulldozers, graders, a well-drilling rig, equipment semis, well-cement trucks, some construction equipment, and associated smaller work vehicles. During operations, the access road would host CO_2 tank trucks, support vehicles, smaller work trucks, and passenger vehicles. The access road would be gated with controlled access and maintained by CONSOL.

The access roads to well sites A and C would depart secondary county roads and be graded across private property (by the provisions of leases, rights-of-way agreements, road grants and easements), graveled for stability and aesthetics, and designed for drainage and sediment control. During construction, the access roads would host large construction vehicles – bulldozers, graders, a well-drilling rig, equipment semis, well-cement and sand trucks, some construction equipment, and associated smaller work vehicles. During operations, the access road would host smaller work trucks and passenger vehicles. These access roads would be gated with controlled access and maintained by CONSOL.

During construction, a small, intermittent (due to shift work during well drilling), and short-duration increase in worker traffic would result. This traffic would result from commuting workers and transporting larger equipment for placement, service, or removal. Between 20 and

30 workers would be expected to participate in daily construction activities. The total work force during construction would not exceed 60 total workers, whose work schedules would be phased as project construction proceeds. Because construction would be short duration, minimal impact on local traffic would result. Construction contractors would acquire the requisite operating permits necessary to access and use local roadways.

Under proposed plans for the project, access for traffic to the railroad right-of-way would occur from Marshall County road 250/14 near the community of Board Tree. This county road connects to Route 250 at a location approximately 2.5 miles northwest of Littleton, West Virginia. Existing roads would be used as much as possible. Any additional roads would be single-lane roads with gravel surfaces.

The projected frequency of CO_2 deliveries would not be expected to exceed two per day. Deliveries would be provided by 20-ton capacity trailer trucks.

During operation, the additional worker vehicle and passenger vehicle traffic on local roads would not be expected to measurably change current traffic patterns or rates. Well work and farm traffic activities are common to the roadways around the project site. A diesel tank truck would occasionally travel along U.S. Route 250 to the railroad-grade access road for delivering CO_2 to the site. Smaller water tank trucks would use county roads and U.S. Route 250 to transport produced water for disposal.

4.6 SOCIOECONOMIC RESOURCES

4.6.1 Affected Environment

According to State of West Virginia statistics, Marshall County normally ranks high on indices of economic indicators when compared to other counties in West Virginia. An important contributor to this economic status is the western boundary of Marshall County, which borders the Ohio River and hosts concentrated clusters of commercial enterprises along the river.

Industries in Marshall County encompass the chemical, manufacturing, recycling, electric generation, stone aggregate, coal, railroad, and oil and gas production sectors and the transportation and construction-trade industries required to support those industries. As a result, the County's unemployment rate is normally below the state average, and the per capita income level is somewhat above the state average level and above the level of neighboring counties.

No dwellings or residents exist on the project site. The City of Cameron (population of 1,816), located approximately five miles to the north, would be the closest incorporated town to the project site. Cameron houses a large interstate natural gas production and transmission company, which employs a significant portion of the city population. Due to a recent consolidation of schools in the city, the local school system employs many professionals and support personnel. The regional coal industry also employs many Marshall County residents in construction, mining, and transportation. Other employment in Marshall County is primarily associated with independent oil and gas drilling and production activities, farming, timbering, and the transportation infrastructure required to support those pursuits.

4.6.2 Environmental Consequences

Construction Impacts

CONSOL and multiple contractors may hire some existing local employees, but project contractors would largely be obtained from surrounding counties. Substantial opportunities would exist for local contractors to be used for site preparation and maintenance, access road construction and maintenance, and associated transportation needs.

Because of the relatively remote location for the proposed project, support for the construction activities would likely be acquired locally, with an attendant small and short-term economic impact. Minimal overall impacts on the local economy would be expected.

Operation Impacts

Personnel from CONSOL, contractors, and consultants would operate the facilities, which would require specialized employees and professionals. Periodic maintenance, repair, small construction, and transportation requirements for project operation could be met from existing workforce in Marshall County. The impact on employment levels in the county would be negligible and of short duration.

Another socioeconomic impact of the project would result from the CO_2 displacement of CBM during underground injection control into the sequestering coal seam. As a mineral, the displaced CBM would require a royalty payment to the owner of the coal from which the CBM would be displaced. Because most of the real property is privately owned, the individuals and families would receive the royalty payments.

Some rights of ingress and egress for the project site would be required from the local property owners, and contracts for leases, road grants, easements, and rights-of-way would be acquired. This economic activity would benefit local property owners and county residents.

4.7 SAFETY AND HEALTH

4.7.1 Affected Environment

Physical activities to be conducted on the project site would include ground breaking, access roadway construction, heavy equipment transport to and from the site, well drilling and completion, facility operation, CBM collection, CO_2 injection, and monitoring. Human safety and health risks would potentially exist for workers involved in these activities.

4.7.2 Environmental Consequences

The project-related physical activities would be governed under OOG's permitting process. Compliance with OOG's regulations and frequent inspections would require that all persons and contractor companies involved in the project possess licenses, permits, and certificates affirming

competency to perform project work. Furthermore, CONSOL's company policy would require that all activities be conducted in compliance with the OOG regulations. The health and safety impacts on workers would, therefore, be minimal.

Construction Impacts

Over 100,000 oil and natural gas wells have been drilled in West Virginia over a period of 100 years or more. The safety and health issues associated with well drilling activities are well known, extensively documented, and well regulated by OOG.

The safety and health impacts on personnel during construction would be limited to potential hazards associated with road building, equipment transport and operation, well drilling and completion, and pipeline construction. Although the project would occupy over 200 subsurface acres, the actual surface operations, where human activity would take place and where health and safety issues would be encountered, would occupy less than 20 acres of property.

Due to the relatively small size of the project site and the OOG permitting and approval processes that would need to be met prior to the initiation of the project, the safety and health risks would be comparable to those normally encountered in the development of a subsurface well, for which the exposure risks are well known, understood, and regulated.

All personnel involved in project construction would require the requisite OOG approvals and be bound by OOG regulations and directions, which would be enforced during construction (and operation) by routine and frequent OOG inspections and by CONSOL policy. CONSOL would comply with applicable Federal Occupational Safety and Health Administration (OSHA) or Mine Safety and Health Administration (MSHA) practices.

Additionally, CONSOL would have overall oversight authority during construction activities. Following installation of project equipment, CONSOL would verify consistency between the original design specifications and the installed equipment.

Operation Impacts

A well drilled into subsurface rock can potentially introduce high-pressure flammable gas to the surface of the ground via the drilled well bore. Based on analysis of producing CBM wells in the region, CONSOL anticipates the gas composition of recovered CBM from the project to be approximately 90% methane and 10% CO_2, with trace quantities of nitrogen, oxygen, and higher molecular weight non-methane hydrocarbon gases.

The wells required for the proposed project, including the equipment used during drilling, the plumbing installed in the well bores, and the equipment constructed on the surface, would be designed to capture and maintain produced gases in closed containment systems. Additionally, all personnel involved in well construction and operation would work under the OOG competency requirements, including periodic retraining.

CONSOL projects that 20,000 tons of CO_2 would be injected into the lower coal seam during the lifetime of the proposed project. The actual CO_2 injection into the underground injection control (UIC) well to be used for sequestration would be conducted by specifically trained and qualified contractors and personnel. The CO_2 would be delivered by truck, transferred into a 50-ton storage tank to be constructed at the project site, and managed at all times within a closed pressure system isolated from free air. Because underground injection control permitting and processes are common in West Virginia and fully regulated by the OOG, no unknown or unregulated hazards would be expected from the proposed project.

The CBM recovery, sequestration, and monitoring wells would be closed pressure systems with few moving parts. After completing the well drilling, a minimal number of personnel would be required for well operations.

4.8 FLOOD PLAINS AND WETLANDS

4.8.1 Affected Environment

The project site would consist of 3 discrete locations with neighboring well locations separated by approximately 2,000 feet in linear distance. While the project would involve about 200 acres of subsurface, surface facilities and activities would occupy approximately 20 acres of land.

The lowest elevation at the project site would be at the location of the UIC well for the CO_2 injection, at 935 feet above mean sea level (amsl). The lowest point would be above the 25-year flood elevation of the nearby Pennsylvania Fork of Fish Creek. The other two surface locations for wells would be at elevations of 1,340 feet amsl and 990 feet amsl and would also be above the 25-year flood elevation of the Pennsylvania Fork.

The center well site (Well B) of the project lies within both the 100-year and 500-year event flood elevations. The other well sites (Wells A and C) lie above those floodplains.

The proposed project would be located on rural farm and timber lands of classic dendritic topography and would be bisected by short (less than one mile) ephemeral and intermittent streams that flow in narrow stream valleys to the perennial stream, Pennsylvania Fork of Fish Creek. Based on a field survey, no wetlands were identified within the project sites.

4.8.2 Environmental Consequences

Since the project site elevations and the required physical structures would lie above the 25-year event flood elevation, but Well B would be within the 100-year and 500-year event flood elevations, a small potential for flood impacts would exist during the 3-year duration of the cooperative agreement. Neither construction nor operation of the proposed project would cause or exacerbate flooding.

The Well B site would be comprised of a well bore with an attached steel wellhead. Additional equipment at the site would include steel piping and valving, a skid-mounted compressor and

vaporizer, a CO_2 storage tank anchored to a concrete pad, a mobile equipment trailer, and miscellaneous associated hardware. During a flood event, the well bore would be shut-in and sealed from the flood environment. CO_2 injection would be halted and the storage tank would be locked out and secured. The compressor, vaporizer, equipment trailer, and other hardware would be disconnected and removed from the site. The remaining wellhead structure and CO_2 storage tank would pose no environmental threat and would not be susceptible to any material damage as a result of a flood event.

Based on discussions with the West Virginia Division of Natural Resources (WVDNR), no documented wetlands exist within the project site. If a wetland area should be encountered during project development, the locations of well sites and facilities would be altered to preserve the wetland and the appropriate jurisdictional agency (WVDNR) would be notified.

4.9 FLORA AND FAUNA

4.9.1 Affected Environment

The project site would be situated in an area of farms and timberland where the predominant commercial activities are farming, timbering, oil well and gas well operations, and subsurface coal mining. Northern temperate deciduous tree species are the primary timberland coverage, with dispersed farm fields and meadowlands.

4.9.2 Environmental Consequences

The proposed project would result in development, construction, and operation of a series of subterranean wells, each with a different, specific intended use and location. The wells would be drilled in a manner similar to conventional shallow oil and gas wells, which are existent throughout the area of the County where the project would be located.

The OOG well-work application, permitting, and inspection processes would verify that no adverse impacts to fish, plants, or wildlife species would result from construction and operation of the project. Correspondence and site surveys (Section 9.0 and Appendix A) revealed that no documented rare, threatened, or endangered species or habitats are present in areas that would be affected by the proposed project. No adverse impact on local flora or fauna would be expected.

4.10 CULTURAL RESOURCES

The West Virginia Division of Culture and History (WVDCH) is charged with administering Section 106 of the National Historic Preservation Act, 36 CFR 800: “Protection of Historic Properties.” This Act requires a “culture and history” survey for certain proposed projects in certain locales.

4.10.1 Affected Environment

The project site would be located in a rural area of farms and timberland of moderate topographic relief with small dendritic drainage systems. The area is developed commercially for farming, timbering, oil well and gas well operations, and subsurface coal mining. In the area surrounding the project site, drilling activities are routinely conducted to develop oil and gas resources.

4.10.2 Environmental Consequences

The proposed project would be dominated by construction, drilling, and operation of subterranean wells that would be regulated by OOG. The well-work permit application rules promulgated by OOG do not require a "culture and history" survey for well work. Available records indicate that no historical or cultural places or archeological sites are located near the proposed site. Due to the geographic location of the proposed project, however, the WVDCH expressed concerns regarding potential archaeological impacts from the project. An independent Phase I cultural survey[24], which verified the absence of cultural resources within the area of potential effect of the project, was provided to the WVDCH. A list of consultation actions, including consultations with the WVDCH, and copies of relevant correspondence are provided in Section 9.0 and Appendix A, respectively.

4.11 SOILS AND GEOLOGY

4.11.1 Affected Environment

The project site would be located in the mature Ohio River drainage basin, in sedimentary rock terrain within the Appalachian Plateau physiographic province. The surface rock of the project site is of the Permian-age Dunkard Group, a non-marine cyclic sequence of sandstones, siltstones, shales, limestones, and coals. The rock is moderately folded, as represented by local synclines and anticlines. The terrain is mature, with well-weathered topography and rounded hilltops of moderate relief above mature streams.

The soils derived from local sedimentary sequences vary from rocky and sandy hilltops to forest soils to rich loams in stream bottomlands.

4.11.2 Environmental Consequences

The construction and operation of the proposed wells and related facilities would be regulated by OOG. The OOG regulations require a well-site-specific *Spill Prevention Control & Counter Measures Plan* for the construction, maintenance, and reclamation of the site. Although the thin soil patina at the project site would be disturbed during construction of the project, restoration would occur upon completing construction and reclamation would be performed upon completing the project. Any disruption of the soil environment would be local, discrete, and short duration.

4.12 NOISE

4.12.1 Affected Environment

The project site would be located in a sparsely populated area of hilly rural farms and timberland with widely spaced farmsteads and private residences. No cities or towns, shopping malls, or industrial parks are located near the proposed project site. Oil well and gas well drilling, well operations, timbering activities, and traffic along Route 250 provide the principal sources of ambient noise.

4.12.2 Environmental Consequences

Construction Impacts

Construction activities would occur at remote sites, well removed from roadways, farmsteads, and residences. Construction-related noise would be localized, intermittent, temporary, and well attenuated by distance, terrain, and woodlands.

Although the well-drilling rigs and associated equipment would operate on 24-hour-per-day schedules, the drilling activity would typically be completed within a short time (10-14 days). The drill rig and associated equipment would then be removed from the project site. The subsequent well completion activity would involve use of diesel equipment that would operate for a very short time duration (30-60 minutes). Near the drill rig, the noise levels would approach 80-90 decibels (dB). The noise generated during the well completion stage would approach 120 dB.

Ear protection devices would be required for workers during the well drilling and completion stages. Since construction activities would occur during a relatively short period of time, with substantial attenuation between the well sites and the nearest residence, no adverse impacts would be expected.

Operation Impacts

During project operation, the principal noise sources would be (1) the CO_2 injection facility and (2) the CBM capture compressor engines. The CO_2 gas would be injected during normal business hours using a surface-mounted compressor with an engine. The CBM capture compressor engines would generally operate around-the-clock. The level of noise generated during the operation stage would be much lower than that encountered during the construction stage. Noise protection for workers would be implemented if deemed necessary.

Since the project site would be located in a remote, sparsely populated area, no deleterious noise impacts would be anticipated beyond the immediate vicinity of the site. Workers on site would use proper noise protection devices commonly employed by industry.

5.0 REGULATORY COMPLIANCE ISSUES

Tables 3-2 and 4-1 and Section 4.0 present Federal and state regulations and permits potentially applicable to the construction and operation of the project. From interviews with Federal and state regulators and a review of the laws, the requisite oversight for the construction and operation of the project was determined to be provided by specific agencies of the WVDEP.

While the permanent sequestration of CO_2 in coal seams would be novel, the physical construction (well drilling and completion) and operations required for the project are well-known and well-established industries in West Virginia. Specifically, activities under the proposed project would encompass drilling subsurface well bores that (1) displace and capture CBM and water from coal seams, (2) enable CO_2 injection into the coal seams, and (3) facilitate monitoring of CO_2 migration in the coal seam. The OOG established both a body of regulations specific to each of these activities and permit processes to assure environmental protection.

Liquid CO_2 required for the project would need to be vaporized by the application of heat through the combustion of methane gas. The DAQ's PDF format would assure that regulatory issues covering gas combustion are addressed.

All CBM that would be displaced or captured from coal seams would probably require a pressure system for moving the gas through pipelines. Methane gas-fired engines used to facilitate that movement would be governed by applicable DAQ regulations.

Service contractors used for the project would operate under agency regulations specific to that contractor's function. For example, drilling contractors would require a WV Division of Highways permit for moving well-drilling rigs to the project site. Each contractor would be required to identify and acquire all permits consistent with contract work requirements.

CONSOL would apply the existing regulatory framework (Federal, state, and local) to mediate design, construction, and operation of the proposed project, which would result in compliance by the project with all permit and oversight requirements.

6.0 CUMULATIVE EFFECTS AND LONG-TERM ENVIRONMENTAL CONSEQUENCES

This section analyzes the cumulative environmental effects likely to be experienced by the environmental resource areas that are described in Section 4.0. Cumulative effects would result from the incremental contributions of the proposed project when added to the potential effects from past, present, and other reasonably foreseeable future actions in the same environmental impact area. The region of influence for this project (the environmental impact area) would be (1) the boundaries of the project site and (2) Marshall County, West Virginia.

Each reasonably foreseeable future action would add an increment to the total environmental impact (cumulative impact). For the purpose of this environmental analysis, the past and present effects are accounted for in the existing (baseline) environmental conditions, which are addressed in Section 4.0 of the EA.

The reasonably foreseeable future actions include other actions likely to be associated with, or likely to proceed from, the proposed project within a reasonable time, and any foreseeable action that could occur in the environmental impact area within the time frame of this analysis. The analysis considered a 5-year planning horizon for any anticipated action. For any future action to be relevant to (and considered in) the cumulative environmental effects analysis, the anticipated action must occur within that time frame and affect resources within the region of influence for the analysis.

For many years, Marshall County, West Virginia, has hosted oil well and gas well drilling, which would be expected to continue independent of the proposed project for at least the 5-year time frame of the analysis.

In light of the past, present, and future actions, the following resources were considered the key resource areas that would be likely to experience cumulative effects: air quality and odor, and water quality.

Air Quality and Odor

Any future oil and gas developments or explorations would be dispersed and fully regulated by OOG to define, limit, quantify, and monitor environmental effects. As a result, the incremental effects of future oil well and gas well drilling would be small, and the cumulative effects that would result from additional drilling, when added to the effects of the proposed project, would be negligible.

If new well-drilling activity should produce commercial quantities of CBM that would require installation and operation of gas-fired engines to compress the gas for transport to market, localized incremental increases in NO_x, CO, and CO_2 would be expected. Due to the wide geographical spacing of wells, the compression engines would lead only to local and marginal increases in environmental effects. Since these operations would fall under the jurisdiction of

the DAQ, the potential environmental effects would be thoroughly analyzed, and the impacts from approved activities would be expected to be minimal.

In addition, activities to sequester CO_2 permanently in unmineable coal seams, with the recovery of displaced CBM gas, would result in marginal improvements in quality of the air environment.

Water Quality

Additional well-work in the environmental impact area would be regulated by OOG to control incidental water and the water courses in the project area. Because water precipitation incidental to wellsite development would be managed through an *Erosion and Sediment Control Plan*, and since dispersed production of water (formation water) would be managed through capture and treatment (or re-injection), minimal or no additional incremental environmental impact would be anticipated.

7.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irreversible and irretrievable commitments of resources for the proposed action would be the energy, materials, and time commitments that could not be reclaimed, reused, recycled or removed during construction or operation of the proposed project. The limited scope of the project, involving installation of 3 wells and establishment of surface facilities to support project activities, would not be expected to adversely affect the availability of material resources (pipe, cement, etc.) required for construction. Commitments of time for drilling equipment would require only short-duration usage, which should not preclude long-term availability for other well development activities. Other material requirements (e.g., gravel, cement, storage tank) would be small and generally available in commercial markets. Use of these resources would not be expected to produce long-term environmental impacts.

8.0 SIMILAR ACTIONS AND ACTIONS BEING CONSIDERED UNDER OTHER NEPA REVIEWS

The proposed action is not related to other actions currently in process or actions being considered under other NEPA reviews.

9.0 CONSULTATION AND PUBLIC PARTICIPATION

9.1 AGENCY CONSULTATION

The agencies and organizations contacted during development of this Environmental Assessment are identified in Table 9-1, and correspondence that documents the contacts and any responses is reproduced in Appendix A.

Table 9-1. Agency and Organizational Contacts

NO.	AGENCY CONTACTED	DATE	AUTHOR	DATE OF AGENCY RESPONSE	AUTHOR
1a	WV Historic Preservation Office	07/10/2002	DOE/Lorenzi		
1b	WV Historic Preservation Office			08/19/2002	J. Wilson
1c	WV Division of Culture & History	09/13/2002	CONSOL/Cairns		
1d	WV Division of Culture & History			10/18/2002	J. Wilson
2	WV Development Office	07/10/2002	DOE/Lorenzi		
3a	U.S. Fish & Wildlife Service	07/10/2002	DOE/Lorenzi		
3b	U.S. Fish & Wildlife Service			08/22/2002	J. Towner
3c	U.S. Fish & Wildlife Service	09/26/2002	CONSOL/Cairns		
3d	U.S. Fish & Wildlife Service			11/13/2002	J. Towner

9.2 PUBLIC PARTICIPATION

A discussion of Public Participation in the NEPA process related to the proposed DOE action and the proposed project for demonstrating Enhanced Coal Bed Methane Production and Sequestration of CO2 in Unmineable Coal Seams will be included in the Final Environmental Assessment.

10.0 REFERENCES

(1) U.S. Environmental Protection Agency, **2000** *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1998*, EPA 236-R-00-001, April 2000.

(2) U.S. Geological Survey, **2000** *Coal-bed Methane Potential and Concerns*, USGS Fact Sheet FS-123-00, October 2000.

(3) Reeves, S.; **2001**, *Geological Sequestration of CO_2 in Deep, Unmineable Coalbeds: An Integrated Research and Commercial-Scale Field Demonstration Project*, SPE 71749, Proceedings of the SPE Annual Technical Conference and Exhibition, September 30-October 3, New Orleans.

(4) Stevens, S.H.; Kuuskraa, V.A.; Spector, D.; Riemer, P. **1998**, *CO_2 Sequestration in Deep Coal Seams: Pilot Results and Worldwide Potential*. Paper presented and published in the Proceedings of the Fourth International Conference on Greenhouse Gas Control Technologies, August 30 - September 2, Interlaken, Switzerland.

(5) Alberta Research Council, *Alberta Field Pilot to Test CO_2 Enhanced Coalbed Methane Recovery*, http://www.arc.ab.ca/envir/Coalbed_pilot.asp

(6) Stanton, R;. Flores, R.; Warwick, P.D.; Gluskoter, H.; Stricker, G.D. **2001** *Coal Bed Sequestration of Carbon Dioxide*, presented and published in the Proceedings of The 2001 International Coalbed Methane Symposium, May 14-18, Tuscaloosa, Alabama.

(7) Netherlands Institute of Applied Geosciences, **2000** *Enhanced Coalbed Methane Production: Combined Methane Production and CO_2 Disposal*, October 2000. (http://www.nitg.tno.nl/ned/appl/g_resources/coal/733.shtml).

(8) Krooss, M.B.; Gensterblum Y.; Siemons, N. **2001**, *High Pressure Methane and Carbon Dioxide Adsorption on Dry and Moisture –Equilibrated Carboniferous Coals*, presented and published in the Proceedings of The 2001 International Coalbed Methane Symposium, May 14-18, Tuscaloosa, Alabama.

(9) Alberta Research Council, Alberta Field Pilot to Test Enhanced Coalbed Methane Recovery. (http://www.arc.ab.ca/envir/coalbed_pilot.asp).

(10) U.S. Department of Energy, *R&D Programs for Carbon Sequestration*, http://www.fe.doe.gov/coal_power/sequestration/index.shtml

(11) Benson, S.M. **2000**, *The GEO-SEQ Project*, presented and published in the Proceedings of the Fifth International Conference of Greenhouse Gas Control Technologies (GHGT-5), August 13-16, Cairns, Australia.

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(23) West Virginia Department of Environmental Protection Office of Oil and Gas website address : http://129.71.240.41/oog/contact.cfm.

(24) Big Blue Archaeological Research, Inc., *Phase I Cultural Resources Survey for the CNX/DOE Horizontal Well Project in Marshall County, West Virginia*, November 2002.

11.0 LIST OF AGENCIES AND INDIVIDUALS CONTACTED

(1) Steve Stathakis, Big Blue Archaeological Research, Inc., Morgantown, WV

(2) Joe Aman, CNX Gas Company LLC, CONSOL Energy, Pittsburgh, PA

(3) Allyn Turner, Division of Water Resources, WV Department of Environmental Protection, Charleston, WV

(4) Richard Fenton, Division of Air Quality, WV Department of Environmental Protection, Charleston, WV

(5) Kay Holtsclaw, Office of Oil and Gas, WV Department of Environmental Protection, Charleston, WV

(6) James Martin, Chief, Office of Oil and Gas, WV Department of Environmental Protection, Charleston, WV

(7) Gene Smith, Office of Oil and Gas, WV Department of Environmental Protection, Charleston, WV

(8) Mike Kobe, Division of Air Quality, WV Department of Environmental Protection, Charleston, WV

(9) Terry Polen, Division of Air Quality, WV Department of Environmental Protection, Charleston, WV

(10) Sandy Humphreys, Division of Mining & Reclamation, WV Department of Environmental Protection, Charleston, WV

(11) Jeff McCormick, Division of Mining & Reclamation, WV Department of Environmental Protection, Charleston, WV

(12) Jim McFarland, Division of Mining & Reclamation, WV Department of Environmental Protection, Charleston, WV

(13) Ken Politan, Division of Mining & Reclamation, WV Department of Environmental Protection, Charleston, WV

(14) Bob Barnes, Division of Waste Management, WV Department of Environmental Protection, Charleston, WV

(15) Dan Fowler, Division of Waste Management, WV Department of Environmental Protection, Charleston, WV

(16) Pete Costello, Office of Environmental Remediation, WV Department of Environmental Protection, Charleston, WV

(17) Leona Francisco, Division of Water Resources, WV Department of Environmental Protection, Charleston, WV

(18) Steve Graley, Division of Water Resources, WV Department of Environmental Protection, Charleston, WV

(19) Tim Craddock, Division of Water Resources, WV Department of Environmental Protection, Charleston, WV

(20) Pavanne Pettigrew, Division of Water Resources, WV Department of Environmental Protection, Charleston, WV

(21) Yogesh Patel, Division of Water Resources, WV Department of Environmental Protection, Charleston, WV

(22) Ed Burdette, Division of Water Resources, WV Department of Environmental Protection, Charleston

(23) Larry Woodfork, Director, WV Geological & Economic Survey, Morgantown, WV

(24) Ken Ashton, WV Geological & Economic Survey, Morgantown, WV

(25) Steve McClellen, WV Geological & Economic Survey, Morgantown, WV

(26) Chamber of Commerce, Marshall County, Moundsville, WV

(27) WV State Historical Preservation Office, Division of Culture & History, Charleston, WV

(28) M. Hugh Hefner, hefcorp-jon, Registered Professional Geologist, Buckhannon, WV

(29) Kevin Boyle, Wildlife Resources Biologist, WV Division of Natural Resources – Natural Heritage Program, Charleston, WV

APPENDIX A

AGENCY CONSULTATION CORRESPONDENCE

1a

U.S. Department of Energy

National Energy Technology Laboratory

July 10, 2002

Ms. Nancy Herholdt
State Historic Preservation Officer
Historic Preservation Office
1900 Kanawha Boulevard East
Charleston, WV 25305-0300

Dear Ms. Herholdt:

The United States Department of Energy (DOE) is considering an action involving Federal participation in a project to investigate Enhanced Coal Bed Methane Production and Sequestration of CO_2 in Unmineable Coal Seams. The project would involve drilling vertical wells and lateral holes from three surface locations on 207 acres of property into two underground coal seams, recovering methane, and injecting carbon dioxide for both enhanced methane recovery and carbon dioxide sequestration. A detailed description of the proposed project and graphics depicting its location are provided as Attachments.

As part of our coordination and consultation responsibilities, and to comply with provisions implementing Section 106 of the National Historic Preservation Act of 1966, we would appreciate receiving any information you have regarding historic or cultural properties in the project area. Your thoughts on the potential impacts associated with the proposed project would also be appreciated.

Based on the scope and location of the proposed project, DOE considers the action of providing federal financial support to be one that would not have significant effect on the environment; thus, DOE has initiated preparation of an Environmental Assessment under the National Environmental Policy Act. Information that you provide will be incorporated and appropriately addressed in the Environmental Assessment. If your initial review concludes that no historic or cultural properties are present in the project area, a written acknowledgement of that conclusion would be appreciated. In any case, the information that you provide will be considered and incorporated in the preparation of the draft Environmental Assessment, which will be provided for review upon availability.

If you require additional information, please contact me by telephone at 412-386-6159 or by e-mail at 'lorenzi@netl.doe.gov.'

Sincerely,

Lloyd Lorenzi, Jr.
NEPA Compliance Officer

Attachments

626 Cochrans Mill Road, P.O. Box 10940, Pittsburgh, PA 15236-0940 ❖ 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507-0880
REPLY TO: Pittsburgh Office • lorenzi@netl.doe.gov • Voice (412) 386-6159 • Fax (412) 386-4604 • www.netl.doe.gov

1b

WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

August 19, 2002

Mr. Lloyd Lorenzi, Jr.
US DOE
626 Cochrans Mill Road
P.O. Box 10940
Pittsburgh, PA 15236

RE: Drilling vertical walls and lateral holes for enhanced methane recovery
FR#: 02-1006-MR

Dear Mr. Lorenzi:

We have reviewed the above mentioned project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

Archaeological Resources:
Thank you for submitting information pertaining to your proposed project. Your information indicates that the project will consist of the drilling of vertical holes in order to extract methane and sequester carbon dioxide. Your information also indicates that this project will involve the construction of access roads and development of wastewater holding ponds. We require additional information in order to complete our review. Please submit a 7.5' USGS topographic map with the exact locations of **all** project activities clearly marked. (This includes proposed access roads and wastewater holding ponds.) As well, please submit ground level photographs of all areas in which ground disturbance will occur. We will complete our review upon receipt of this information.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please call Rachel Black, Staff Archaeologist at (304) 558-0240.*

Sincerely,

Joanna Wilson

Joanna Wilson
Senior Archaeologist

reb

THE CULTURAL CENTER • 1900 KANAWHA BOULEVARD, EAST • CHARLESTON, WEST VIRGINIA 25305-0300
TELEPHONE 304-558-0220 • FAX 304-558-2779 • TDD 304-558-3562
EEO/AA EMPLOYER

1c

CONSOL ENERGY.

CONSOL Energy Inc.
Research & Development
4000 Brownsville Road
South Park, PA 15129-9566

phone: 412/854-6600
fax: 412/854-6613
web: www.consolenergy.com

September 13, 2002

Ms. Joanna Wilson, Sr. Archaeologist
West Virginia Division of Culture and History
The Cultural Center
1900 Kanawha Boulevard
Charleston, West Virginia 25305-0300

Subject: Response to letter dated August 19, 2002, to Mr. Lloyd Lorenzi, Jr., of U.S. DOE

Reference: FR No. 02-1006-MR

Dear Ms. Wilson:

At your request, enclosed is a 7.5' USGS topographic map and ground level photographs for the proposed drilling project in Marshall County. In addition, I have included a compact disc that contains an electronic presentation of the photographs (Microsoft PowerPoint). The electronic presentation includes a brief description with each photograph.

If you require any additional information to complete your review, please contact me at (412) 854-6640.

Sincerely,

G. L. Cairns
/ls

Attachment

cc: F. P. Burke
R. M. Statnick
L. Lorenzi - U.S. DOE

1d

WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

October 18, 2002

Mr. G. L. Cairns
Consol Energy
4000 Brownsville Road
South Park, PA 15129-956

RE: Drilling vertical walls and lateral holes for enhanced methane recovery
FR#: 02-1006-MR-1

Dear Mr. Cairns:

We have reviewed the above mentioned project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

Archaeological Resources:
Thank you for submitting additional information pertaining to your project area. A search of office site files and maps located no known sites within the 1 mile Area of Potential Effect (APE) of the proposed project area. However, due to the geographic nature of the project area, we have concerns as to its archaeological potential. Therefore, we cannot provide comment regarding the effects of this project on archaeological resources until the results of a Phase I archaeological survey are submitted. The areas to be surveyed include the following: southern two well locations and associated holding pond areas along Pennsylvania Fork. For you convenience we are enclosing an archaeological consultants list from which you may select a qualified consultant. If you have questions regarding archaeological survey or bids you may receive for this process, please do not hesitate to contact this office.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please call Rachel Black, Staff Archaeologist at (304) 558-0240.*

Sincerely,

Joanna Wilson
Senior Archaeologist

reb

THE CULTURAL CENTER • 1900 KANAWHA BOULEVARD, EAST • CHARLESTON, WEST VIRGINIA 25305-0300
TELEPHONE 304-558-0220 • FAX 304-558-2779 • TDD 304-558-3562
EEO/AA EMPLOYER

(2)

U.S. Department of Energy

National Energy Technology Laboratory

July 10, 2002

Mr. John F. Herholdt, Jr.
Manager, Energy Efficiency Program
West Virginia Development Office
State Capitol Complex
Building #6, Room 645
Charleston, WV 25305

Dear Mr. Herholdt:

The purpose of this letter is to inform you that the U.S. Department of Energy (DOE) is considering an action involving Federal participation in a project to investigate Enhanced Coal Bed Methane Production and Sequestration of CO2 in Unmineable Coal Seams. The project would involve drilling vertical wells and lateral holes from three surface locations on 207 acres of property into two underground coal seams, recovering methane, and injecting carbon dioxide for both enhanced methane recovery and carbon dioxide sequestration. A detailed description of the proposed project and graphics depicting its location are provided as Attachments.

Based on review of currently available information on the scope, location, and projected environmental consequences of the proposed project, DOE considers that proposed action to be one for which an Environmental Assessment (EA) would be the appropriate level of analysis under DOE's National Environmental Policy Act Implementing Procedures. The EA will be prepared in compliance with the requirements of the National Environmental Policy Act of 1969. Our Office anticipates completion of a draft EA within the next few months, and we welcome initial input from the State of West Virginia regarding the scope of the environmental analyses that should be incorporated into the EA. Upon availability, copies of the draft EA will be forwarded to you for review and comment. The Department of Energy will address comments in a final EA, which will form the basis for decision-making.

Please direct any questions or feedback on this matter to Mr. Lloyd Lorenzi at (412) 386-6159.

Sincerely,

Lloyd Lorenzi, Jr.
NEPA Compliance Officer

Attachments

626 Cochrans Mill Road, P.O. Box 10940, Pittsburgh, PA 15236-0940 ◆ 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507-0880
REPLY TO: Pittsburgh Office • lorenzi@netl.doe.gov • Voice (412) 386-6159 • Fax (412) 386-4604 • www.netl.doe.gov

3a

U.S. Department of Energy

National Energy Technology Laboratory

July 10, 2002

Mr. Jeffrey K. Towner
Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
West Virginia Field Office
694 Beverly Pike
Elkins, WV 26241

Dear Ms. Knight:

The United States Department of Energy (DOE) is considering an action involving Federal participation in a project to investigate Enhanced Coal Bed Methane Production and Sequestration of CO_2 in Unmineable Coal Seams. The project would involve drilling vertical wells and lateral holes from three surface locations on 207 acres of property into two underground coal seams, methane recovery, and carbon dioxide injection for enhanced methane recovery and for coal bed sequestration. A detailed description of the proposed project and graphics depicting its location are provided as Attachments.

As part of our coordination and consultation responsibilities, and to comply with both Section 7 of the Endangered Species Act of 1973, as amended, and provisions of the Fish & Wildlife Coordination Act, we would appreciate receiving any information you have on wildlife resources, including endangered and threatened species or critical habitat, in the project area. Your thoughts on the potential impacts associated with the proposed project would also be appreciated.

Based on the scope of the proposed project, DOE considers the action of providing federal financial support to be one that would not have significant effect on the environment; thus, DOE has initiated preparation of an Environmental Assessment under the National Environmental Policy Act. Information that you provide will be incorporated and appropriately addressed in the Environmental Assessment. If your initial review concludes that no endangered or threatened species (or their habitat) are present in the project area, and that neither protected species nor their habitat would be affected by the proposed action, a written acknowledgement of that conclusion would be appreciated. In any case, the information that you provide will be considered and incorporated in the preparation of the draft Environmental Assessment, which will be provided for review upon availability.

If you require additional information, please contact me by telephone at 412-386-6159 or by e-mail at 'lorenzi@netl.doe.gov.'

Sincerely,

Lloyd Lorenzi, Jr.
NEPA Compliance Officer

Attachments

626 Cochrans Mill Road, P.O. Box 10940, Pittsburgh, PA 15236-0940 ◆ 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507-0880
REPLY TO: Pittsburgh Office • lorenzi@netl.doe.gov • Voice (412) 386-6159 • Fax (412) 386-4604 • www.netl.doe.gov

3b/2

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

AUG 2 2 2002

Mr. Lloyd Lorenzi, Jr.
U.S. Department of Energy
National Energy Technology Laboratory
P.O. Box 10940
Pittsburgh, PA 15236-0940

Dear Mr. Lorenzi:

This responds to your information request of July 10, 2002 regarding the potential impacts of a proposed project on wetlands and federally listed endangered and threatened species. The United States Department of Energy (DOE) is considering a cooperative agreement with Consol Energy, Inc. to evaluate the effectiveness and economics of methane recovery from unmineable coal seams and subsequent sequestration of carbon dioxide in those coal seams. The project involves drilling vertical wells and lateral holes into two underground coal seams from three surface locations on 207 acres of property in Marshall County, West Virginia. Excavation and construction of facilities at the surface would be conducted prior to drilling. This includes construction of access roads, development of wastewater holding ponds, and surface preparation for the gas collection system, carbon dioxide and injection equipment, and monitoring equipment.

The endangered running buffalo clover, Trifolium stoloniferum, could occur in the project area and could be impacted by the project. This species occurs in slightly disturbed and well drained areas of forest where the soil has been exposed to partial sunlight, such as old jeep trails, farm roads or foot trails. It has also been found in open areas of forests without any apparent disturbance from vehicles or foot traffic. We recommend that any areas of proposed disturbance from the project, including access road construction, be surveyed for this plant. The survey should be conducted by an individual with experience in identifying this plant and familiar with its habitat. A survey is best conducted when the plant is in bloom and certainly within the growing season, as this perennial plant may not be vegetatively persistent in the winter months. Please report survey findings to our office.

Another federally listed species that may occur within the proposed project area is the endangered Indiana bat, Myotis sodalis. This species may use the project area for foraging and roosting between April 1 and November 14. Indiana bat summer foraging habitats are generally

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defined as riparian, bottomland, or upland forest, and old fields or pastures with scattered trees. Roosting/maternity habitat consists primarily of live or dead hardwood tree species such as shagbark hickory, which have exfoliating bark that provides space for bats to roost between the bark and the bole of the tree. Tree cavities, crevices, splits, or hollow portions of tree boles and limbs also provide roost sites.

The U.S. Fish and Wildlife Service (Service) has determined the number of acres of suitable foraging and roosting habitat on the West Virginia landscape available to each Indiana bat known to occur there. On that basis, we have determined that small projects, generally affecting 17 acres or less of suitable foraging and roosting habitat, will have little chance (at the 98% confidence level) of resulting in direct or indirect take of the species and is therefore considered discountable. A determination should be made as to the amount of suitable habitat that will be removed as a result of this project. If less than 17 acres will be removed, tree removal can occur at any season of the year. If 17 acres or more will be disturbed, the Service recommends one of two options. Mist net surveys can be conducted to determine if the summer foraging and roosting habitat within the area affected by the proposed project is occupied. A survey plan should be submitted to the Service and the West Virginia Division of Natural Resources (WVDNR) for concurrence prior to conducting the work. The survey should follow the standard Indiana bat mist net protocol from the Draft Indiana Bat Recovery Plan, and be conducted between May 15 and August 15 by a qualified mammalogist with experience in identifying Indiana bats.

If Indiana bats are collected, the data should be incorporated into a Biological Assessment (BA) pursuant to Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Biological Assessments are designed to assist Federal agencies in determining if formal consultation is required. The Service recommends that the following steps be taken in preparation of the BA.

1. Conduct recent interviews of recognized experts on the species at issue, including those within the Service, WVDNR, U.S. Forest Service, universities and others who may have data not yet found in scientific literature.

2. Review up to date literature and other scientific data to determine the species distribution, habitat needs, and other biological requirements.

3. Analyze the effects of the action on individuals and populations of the species and its habitat, including indirect and cumulative effects of the action.

4. Analyze alternative actions that may provide conservation measures.

5. Conduct any studies necessary to fulfill the requirements of (1) through (4) above.

6. Review any other relevant information.

If you determine that the proposed action "may affect" a federally listed species you must

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request, in writing, formal consultation with this office, pursuant to Section 7(a) of the ESA. If the determination is "no effect", no further consultation is necessary, unless requested by the Service. Regardless of your findings, you should provide this office a copy of the survey results and any other relevant information that assisted you in reaching your conclusion.

Another option the Federal agency may use to address Indiana bat concerns is to assume Indiana bats are present and schedule timber removal operations during the hibernation period, between November 15 and March 31. If that option is chosen, the Federal agency must then submit a calculation of the percentage of area of suitable habitat that would remain within a two-mile radius after the proposed disturbance. If the Service determines that the extent of disturbance is significant and may affect the Indiana bat, the Federal agency must request formal Section 7 consultation with the Service or conduct mist net surveys to determine if Indiana bats are, in fact, present. If Indiana bats are collected during mist netting, the Federal agency must prepare a BA, as described above.

Our review of the National Wetlands Inventory 7½-minute topographic maps indicates no wetlands occur on the site. However, definitive determinations of the presence of waters of the United States, including wetlands, and the need for permits, if any, are made by the U.S. Army Corps of Engineers. They may be contacted at: Pittsburgh District, Regulatory Branch, William S. Moorhead Federal Building, 1000 Liberty Avenue, Pittsburgh, Pennsylvania 18222-4188, telephone (412)395-7152.

If you have any questions regarding this letter, please have your staff contact Linda Smith of my staff, or contact me directly at (304) 636-6586, or at the letterhead address.

Sincerely,

Jeffrey K. Towner

Jeffrey K. Towner
Field Supervisor

Enclosure

FEDERALLY LISTED ENDANGERED THREATENED SPECIES IN WEST VIRGINIA

COMMON NAME	SCIENTIFIC NAME	STATUS	DISTRIBUTION
BIRDS			
Eagle, bald	Haliaeetus leucocephalus	T*	Entire state Nest sites: (1) Mineral, (5) Hampshire, (2) Pendleton, (1) Grant, and (4) Hardy
MAMMALS			
Bat, Indiana	Myotis sodalis	E	Known hibernacula in Tucker, Pocahontas, Greenbrier, Randolph, Preston, Pendleton, Monroe and Mercer Counties. Critical habitat: Hellhole Cave, Pendleton County - Bats may occupy summer habitat throughout the entire state
Bat, Virginia big-eared	Corynorhinus (=Plecotus) townsendii virginianus	E	Primarily northeastern counties, especially Pendleton, Tucker and Grant Counties. Critical habitat: Hellhole Cave, Cave Mountain Cave, Hoffman School Cave, and Sinnit/Thorn Mountain Cave in Pendleton Co.; Cave Hollow/Arbogast Cave in Tucker Co.
Cougar, eastern	Felis concolor cougar	E	Entire state, may be extinct
Squirrel, West Virginia northern flying	Glaucomys sabrinus fuscus	E	Pocahontas, Tucker, Pendleton, Greenbrier, Webster, and Randolph Counties, within proclamation boundary of Monongahela National Forest
MOLLUSKS			
Snail, flat-spired three-toothed land	Triodopsis platysayoides	T	Monongalia and Preston Counties, mainly in Cooper's Rock State Forest area, both sides of Cheat River Gorge
Mussel, tubercled-blossom pearly	Epioblasma (=Dysnomia) torulosa torulosa	E	Kanawha River, Fayette Co., may be extinct
Mussel, pink mucket pearly	Lampsilis abrupta (=orbiculata)	E	Kanawha River, Fayette Co., Ohio River, Cabell, Mason and Wood Counties; Elk River, Kanawha Co.
Mussel, James spiny	Pleurobema (=Canthyria) collina	E	Monroe Co., South Fork of Potts Creek and Potts Creek
Mussel, fanshell	Cyprogenia stegaria (=irrorata)	E	Kanawha River, Fayette Co.; Ohio River, Wood Co.

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COMMON NAME	SCIENTIFIC NAME	STATUS	DISTRIBUTION
Mussel, clubshell	Pleurobema clava	E	Elk River, Braxton, Kanawha, and Clay Counties; Hackers Creek, Lewis Co.; Meathouse Fork, Doddridge, Co.; South Fork Hughes River, Ritchie County
Mussel, northern riffleshell	Epioblasma torulosa rangiana	E	Elk River, Kanawha Co.
PLANTS			
Harperella	Ptilimnium nodosum	E	Morgan and Berkeley Counties
Shale barren rock cress	Arabis serotina	E	Greenbrier, Hardy, and Pendleton Counties
Running buffalo clover	Trifolium stoloniferum	E	Fayette, Webster, Tucker, Pocahontas, Barbour, Brooke and Randolph Counties
Virginia spiraea	Spiraea virginiana	T	Nicholas, Fayette, Mercer, Raleigh, Summers, and Greenbrier Counties
Northeastern bulrush	Scirpus ancistrochaetus	E	Berkeley and Hardy Counties
Small whorled pogonia	Isotria Medeoloides	T	Greenbrier County
AMPHIBIANS			
Cheat Mountain salamander	Plethodon nettingi	T	Pendleton, Pocahontas, Randolph, Grant and Tucker Counties

* Threatened
** Endangered

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Revised April 12, 2002

(3c)

CONSOL ENERGY.

CONSOL Energy Inc.
Research & Development
4000 Brownsville Road
South Park, PA 15129-9566

phone: 412/854-6600
fax: 412/854-6613
web: www.consolenergy.com

September 26, 2002

Mr. Jeffrey Towner, Field Supervisor
U.S. Fish and Wildlife Service
West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

Subject: Response to letter dated August 22, 2002, to Mr. Lloyd Lorenzi, Jr., of U.S. DOE

Dear Mr. Towner:

At your recommendation, a survey of all areas of proposed disturbance for the DOE project in Marshall County was conducted on September 10, 2002, by Mr. M. Hugh Hefner of hefcorp-jon. Mr. Hefner, a registered professional geologist who serves as a consultant for the proposed project, is experienced in identifying the habitats of endangered species.

The attached letter reports the survey findings and addresses the concerns of any endangered species potentially impacted by the project.

If you require any additional information to complete your review, please contact me at (412) 854-6640.

Sincerely,

Gary Cairns

G. L. Cairns
/ls

Attachment

cc: F. P. Burke
R. M. Statnick
L. Lorenzi - U.S. DOE

3c/2

hefcorp-jon
An Energy Company

M Hugh Hefner
Registered Professional Geologist

PO Box 2434
Buckhannon WV 26201

304.472.0287

hefcorp-jon

MONDAY, SEPTEMBER 24, 2002

MR. GARY L. CAIRNS, PE, RESEARCH ENGINEER
CONSOL ENERGY
RESEARCH & DEVELOPMENT
4000 BROWNSVILLE ROAD
SOUTH PARK PA 15129-9566

DEAR MR. CAIRNS,

ON TUESDAY, SEPTEMBER 10, 2002, I VISITED THE MARSHALL COUNTY, WEST VIRGINIA SITE DEFINED FOR THE JOINT CONSOL ENERGY/US DEPARTMENT OF ENERGY CARBON DIOXIDE SEQUESTRATION PROJECT ("PROJECT"). THE PURPOSE OF MY SITE VISIT WAS TWO-FOLD: 1) TO EXAMINE THE PROJECT SITE FOR THE PRESENCE OF THE ENDANGERED PLANT SPECIES "RUNNING BUFFALO CLOVER" [*TRIFOLIUM STOLONIFERUM*] AND 2) TO DETERMINE THE AREAL EXTENT OF DISTURBED HABITAT AFFECTED BY THE DEVELOPMENT AND OPERATION OF THE PROJECT SITE.

MY SITE VISIT ENCOMPASSED THE THREE WELL SITES OF THE PROJECT, THE SURVEYED PATHS OF THE PROJECT-ACCESS ROADWAYS, AS WELL AS THE TEMPORARY EXTENDED AREAS TO BE DISTURBED DURING THE CONSTRUCTION OF THE WELLS AND PROJECT SITE. MY FINDINGS FOLLOW.

THE TOTAL DISTURBED AREA OF THE PROJECT, BOTH THAT AREA TO BE TEMPORARILY DISTURBED DURING PROJECT CONSTRUCTION AND DEVELOPMENT, AND THAT AREA TO BE DISTURBED FOR THE DURATION OF THE PROJECT, ENCOMPASSES APPROXIMATELY SEVEN (7) ACRES.

A CLOSE ON-SITE FIELD RECONNAISSANCE OF THE PROJECT AREA FOUND NO RUNNING BUFFALO CLOVER FLORA, EITHER GROUPED OR AS SINGLE PLANTS. NEITHER WAS THERE ANY EVIDENCE ANYWHERE ON THE PROJECT SITE OF AREAS THAT HAD BEEN DISTURBED PRIOR TO MY VISIT, WHICH MAY HAVE HOSTED RUNNING BUFFALO CLOVER FLORA.

MY FIELD RECONNAISSANCE EXTENDED BEYOND THE PLANNED PROJECT-DISTURBED AREAS TO HABITATS SUITABLE FOR THE ESTABLISHMENT OF RUNNING BUFFALO CLOVER FLORA. FROM MY PROJECT-SITE VISIT, I HAVE CONCLUDED THAT THE PROJECT SITE, AND THE SURROUNDING FLORAL ENVIRONMENT, HAS NO INDIVIDUAL PLANTS OR COLONIES OF RUNNING BUFFALO CLOVER.

I BASE MY EXPERTISE TO CONDUCT THIS STUDY ON NEARLY TWENTY-FIVE (25) YEARS OF DESIGNING, PERMITTING, SITING, OPERATING, AND RECLAIMING PROJECTS OF THIS TYPE. MY COMPANY DESIGNS

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JURISDICTIONAL AGENCY PERMIT APPLICATIONS AND MODIFICATIONS NECESSARY TO AFFECT PROJECTS OF THIS TYPE, WHICH APPLICATIONS AND MODIFICATIONS REQUIRE HABITAT IDENTIFICATION, PRESERVATION, AND RECLAMATION.

ADDITIONALLY, I HOLD AN ADJUNCT FACULTY APPOINTMENT IN THE DIVISION OF LAND RESOURCES AT GLENVILLE STATE COLLEGE, GLENVILLE, WEST VIRGINIA, WHERE I TEACH LAND RECLAMATION. THE WORK I DO THERE REQUIRES A COMPREHENSIVE KNOWLEDGE OF PROJECT REGULATORY PROGRAMS AND REQUIREMENTS AND COMPREHENSIVE KNOWLEDGE OF ENDANGERED PLANTS AND ANIMALS AND THEIR RESPECTIVE HABITATS.

IF I MAY DO ANYTHING MORE FOR YOU, PLEASE CALL ME AT 304.472.0287. THANK YOU. I REMAIN

VERY TRULY YOURS,

M HUGH HEFNER
REGISTERED PROFESSIONAL GEOLOGIST
PRESIDENT

(3d)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

NOV 13 2002

Mr. G. L. Cairns
CONSOL Energy, Inc.
400 Brownsville Road
South Park, PA 15129-9566

Dear Mr. Cairns:

This letter concerns a survey conducted for the endangered running buffalo clover, Trifolium stoloniferum, on a site that CONSOL Energy, Inc. is evaluating for methane recovery and subsequent sequestration of carbon dioxide in Marshall County, West Virginia.

Linda Smith, of my staff, surveyed the proposed areas of disturbance within the project area on November 5, 2002. No running buffalo clover was found. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service. Should project plans change involving additional areas of disturbance, the Service should be contacted to see if this determination should be reconsidered.

If you have any questions regarding this letter, please contact Linda Smith, of my staff, or contact me directly at (304) 636-6586, or at the letterhead address.

Sincerely,

for William A Tolin
Jeffrey K. Towner
Field Supervisor

Enclosure